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~~PREFACE~~

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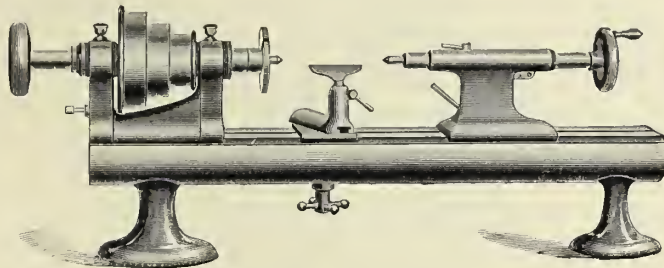
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FIG. 1.



No. 3 MACHINISTS' BENCH LATHE.

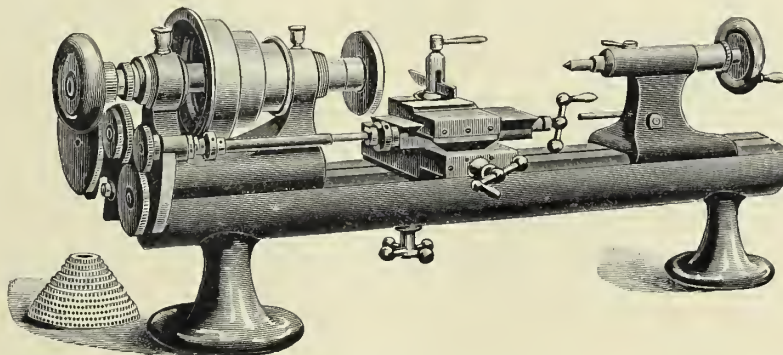
THESE LATHES combine the very latest improvements, and are without question the best of their class manufactured. The spindle has a half-inch hole through it, and it is hardened and runs in hardened steel bearings, which are ground by special machines to perfect truth and fit.

The side of the cone pulley is indexed two rows of holes: one of 60, giving subdivisions of 60, 30, 20, 15, 12, 10, 6, 5, 4, 3, 2, and one of 48, giving 48, 24, 16, 12, 8, 6, 4, 3, 2.

The back end of spindle is made long enough to attach indexes, which, with a gear-cutting attachment, converts the lathe into a gear cutter and milling machine, in which taps, dies, fluted reamers, etc., can be cut, and also ground after hardening.

This lathe is adapted to use the self-centering spring chuck for holding wire or washers, which is used in all watch factories (the largest wire chuck holding wire $\frac{3}{8}$ inch). The usual scroll and independent jawed chucks can be fitted.

FIG. 2.



No. 3 MACHINISTS' BENCH LATHE WITH THREAD-CUTTING ATTACHMENT.

THE cone pulley on headstock is reversed in order to give more strength to the front bearing standard and to allow the index-pin to be put in the back standard, away from the chips and dirt, which have proved a source of trouble when at the opposite end.

The head and tailstock, and, as far as possible, all fixtures, are secured to the bed by an improvement of bolt and cam, and by this plan are quickly tightened or loosened.

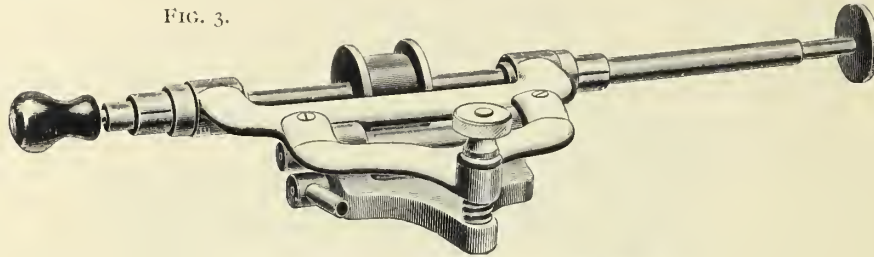
The bearings have ornamental brass dust rings, to exclude dust and chips and prevent the oil from flying out upon the workman. The head and tailstock and all interchangeable parts are made to standard gauges, so that additional attachments may be made without necessitating the return of the lathe.

SPECIFICATIONS.

Length of Bed,	.	.	.	28, 32 or 36 inches, as ordered.
Between Centers,	.	.	.	14, 18 or 22 " "
Swing,	.	.	.	7 inches.
Cone Pulley is	$4\frac{1}{2}$,	$3\frac{1}{2}$	and $2\frac{1}{2}$ inches in diameter by $1\frac{1}{8}$ inch face.	

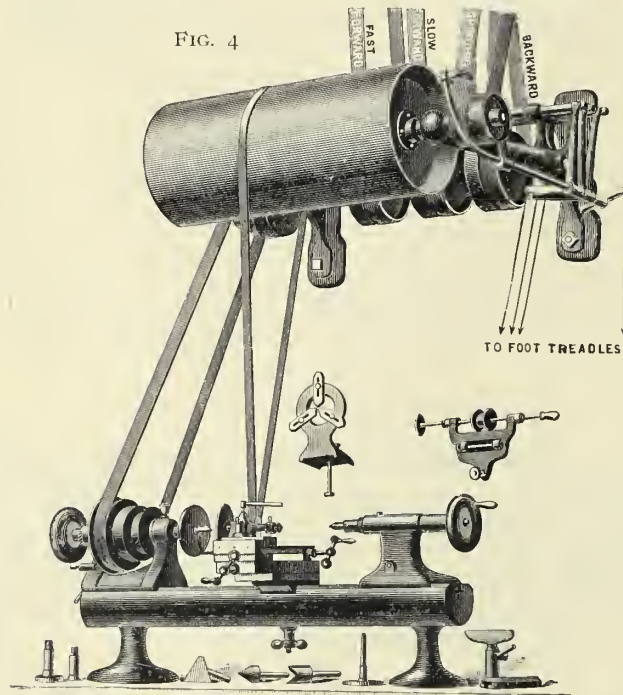
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FIG. 3.



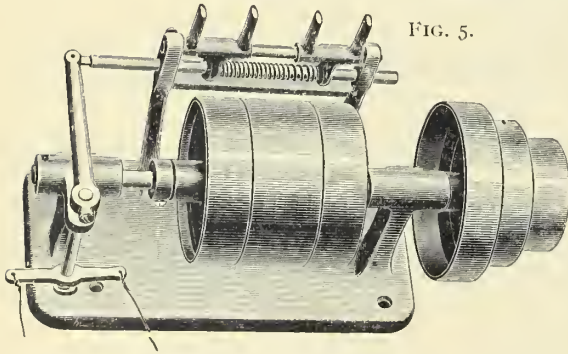
INSIDE GRINDING ATTACHMENT FOR SMALL HOLES.

FIG. 4.



No. 3 MACHINISTS' BENCH LATHE,
With Outside Grinder on Slide Rest and 3 Speed Countershaft with Drum for Grinding Attachment.

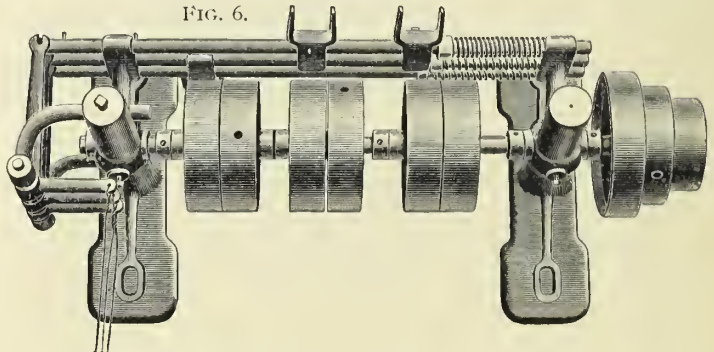
FIG. 5.



TWO-SPEED COUNTERSHAFT.

Both are forward motion. If speed of drawing shaft is 250, it requires pulleys 12 inch and 4 inch diameter.

FIG. 6.

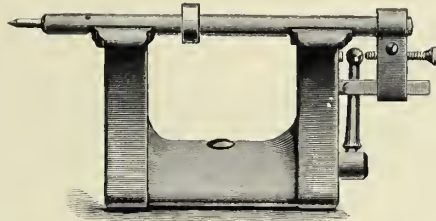


THREE-SPEED COUNTERSHAFT.

One slow forward motion, driven by 4 inch pulley, one fast forward motion, driven by 12 inch pulley, one backward motion, for thread cutting and grinding, driven by 8 inch pulley.

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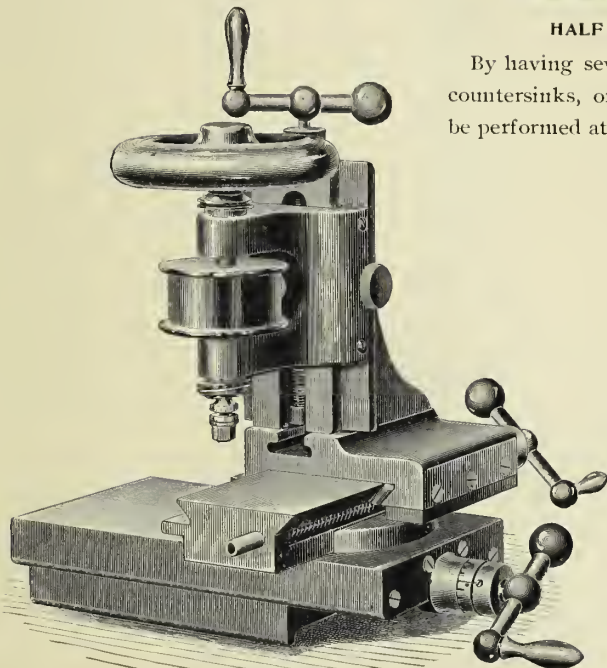
FIG. 7.



HALF OPEN TAILSTOCK.

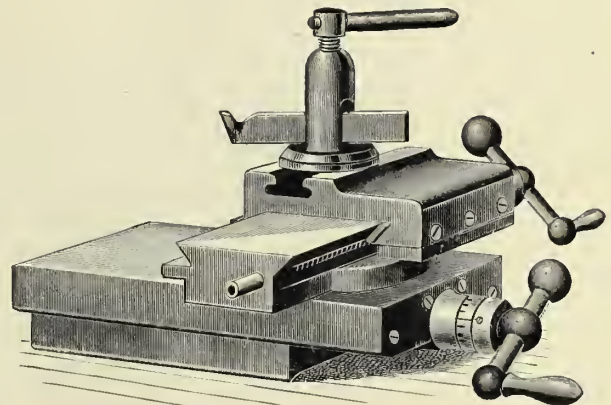
By having several spindles holding drills, countersinks, or taps, their operations may be performed at one chucking.

FIG. 8.



IMPROVED WHEEL CUTTING ATTACHMENT,
Mounted on Slide Rest Driven by Counter on Bench.

FIG. 9.



IMPROVED STYLE SLIDE REST,
With Graduations.

ATTACHMENTS FOR No. 3 MACHINIST'S BENCH LATHE.

THE Tailstock Spindle passes entirely through the stock, has a motion of $2\frac{1}{2}$ inches, and is graduated so its motion may be read. These new features are not shown in the illustration.

The **Slide Rest** is an accurately made tool, has scraped fits, the swivel is indexed into degrees, and its longitudinal feed screw runs in hardened steel bearings. Both feed screws have a large indexed check nut which indicates .001 of an inch.

The **Screw Cutting Attachment** consists of a train of gears and connection to slide rest, so that a wide range of numbers of threads to the inch can be cut, either straight or tapering. It is arranged so as to be easily removed and replaced. It cuts both English and Metric threads with the same screw, by means of translating gears.

The **Gear-Cutting Attachment** is fitted to the slide rest and cuts bevel, spur and crown wheels and pinions.

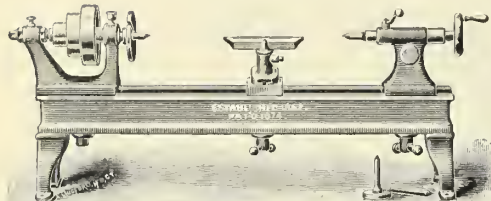
The **Grinding Attachments** are fitted to the slide rest, and give the ability to grind nearly all the forms that can be turned or cut, such as fluted reamers, mills, etc.

The **Back Rest** is of the usual form.

The **Countershafts** are shown on page 2.

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FIG. 10.



8 INCH SWING HAND OR SPEED BENCH LATHE.

8 INCH SWING, HAND OR SPEED BENCH LATHE.

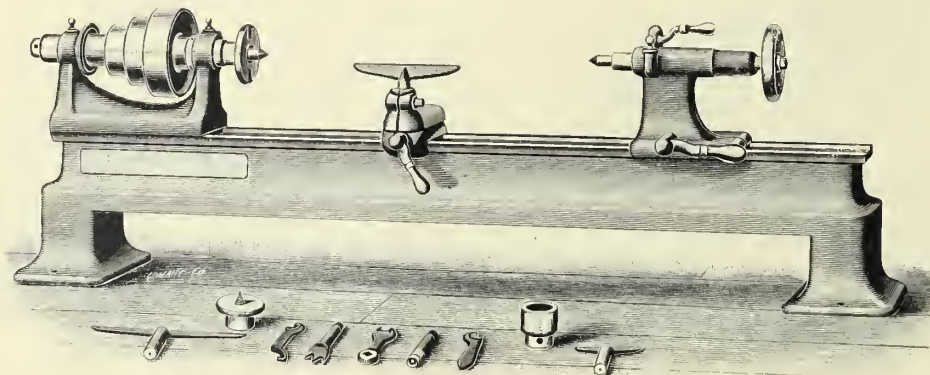
THIS LATHE is designed to supply the demand for an extra well built small Lathe. They are fitted with patent hard open grain, cast iron, taper shell bearings, running in gun metal boxes. The back end of steel spindle is tapering and hardened, and is fitted to an independent adjusting cast iron step. For fine adjustment this step is fitted with a screw separated from the spindle by two buttons made of steel and hardened.

This combination gives accuracy of position with large wearing surface, while the open iron bearings take up and hold the lubricator, reducing the friction to a low point. They can be run at high speed without heating.

SPECIFICATIONS.

Swings, - - - - -	8 inches	Takes in between centers, - - -	16½ inches
Length of bed, - - - - -	30 inches	Hole through spindle, - - -	¼ inch

FIG. 11.



11 INCH SWING HAND OR SPEED BENCH LATHE.

THIS LATHE is furnished extensively for manual training schools, laboratory work, etc., etc. We furnish this Lathe with either floor or bench legs.

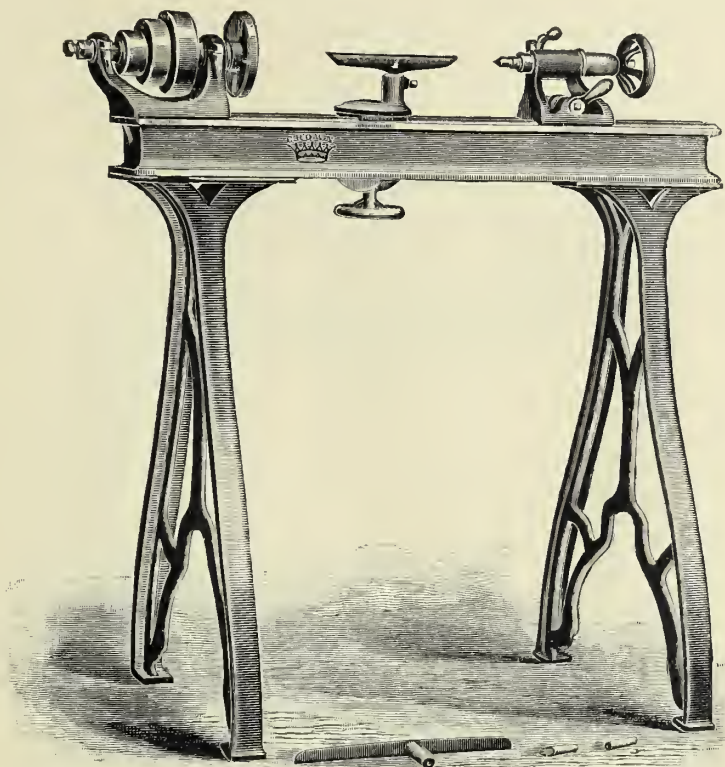
SPECIFICATIONS.

Swing over Bed.	Length of Bed.	Swing over Rest.	Distance between Centers	Weight.
10 inches.	3½ feet.	7 inches.	24 inches.	320
10 "	4½ "	7 "	36 "	340

Tight and loose pulleys on countershaft 6 inch diameter by 3 inch face. Countershaft should make 330 revolutions per minute; for wood-turning, 550 per minute. Worm face plate, bell chuck centers for wood-turning, and slide rest, are furnished as extras.

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FIG. 12.



9 INCH SWING HAND OR SPEED LATHE,

FOR FOOT OR POWER.

THIS is a strong, substantial and thoroughly well-built Lathe, designed for turning in metals or wood, boring, drilling, polishing, etc. It is provided either with or without foot power.

The head stock has a three-speed cone for $1\frac{1}{4}$ inch belt, hollow steel spindle with $\frac{3}{8}$ hole, and hard bronze metal boxes which are adjustable to take up the wear. Centers are standard taper $\frac{1}{2}$ inch to the foot.

The tail stock has a steel spindle with self-discharging center, cam locking device, etc. The bed, which is strong and solid, has two raised V ways.

Each Lathe is provided with two point, and one each cup and spur center, short and long T rests, wrench, and everything complete as shown in cut.

The patent foot power applied to this Lathe consists of double treadles, with a walking motion, embracing an entirely new principle. The treadles, which are movable, work independent of each other, each being connected at opposite ends of the driving wheel shaft in such a manner as to produce a strong, positive and continuous power. It can be started or stopped instantly, and may be operated with both feet when sitting, or with one foot when standing, as desired.

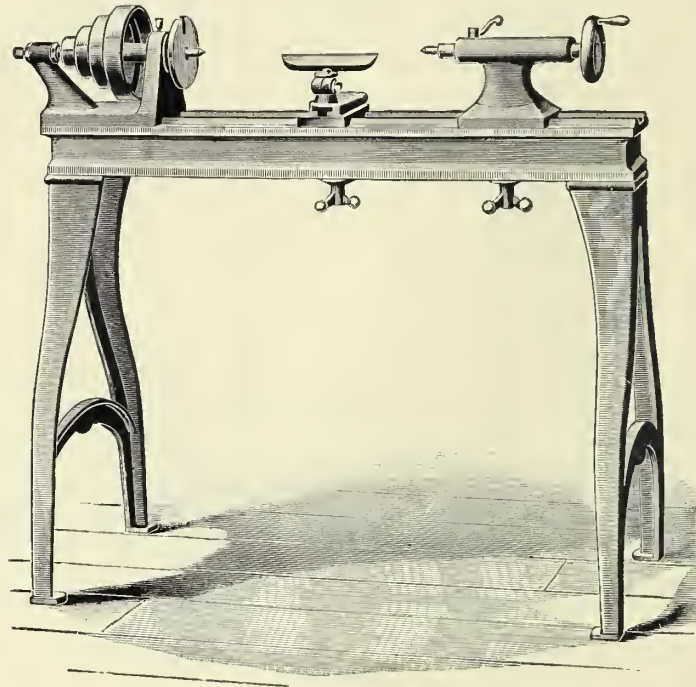
Countershaft furnished in place of foot power without extra charge.

No. 1 Hand Lathe.—Swing, 9 inches ; between centers, 24 inches ; length of bed, 41 inches ; weight, 245 pounds.

No. 2 Hand Lathe.—Swing, 10 inches ; between centers, 36 inches ; length of bed, 53 inches ; weight, 275 pounds.

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FIG. 13.



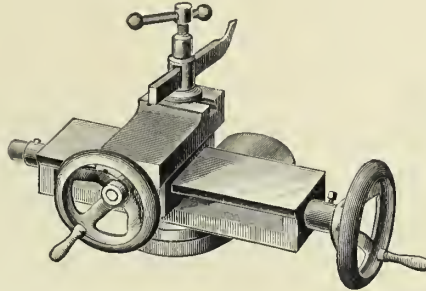
11 INCH SWING HAND OR SPEED LATHE.

THIS LATHE has an improved conical cast-iron bearing, which is forced upon a steel spindle, making the spindle and bearing practically one; the spindle runs in gun metal boxes and has easy means of adjustment. The workmanship and material used are strictly first-class. There are more than 1,000 of these lathes in use, which is conclusive proof of their merit. This lathe can be furnished with *improved slide rest*, and also lever movement of tail stock spindle.

Swing, 11 inches; length of bed, 4 feet. Speed of countershaft, 250 revolutions per minute.

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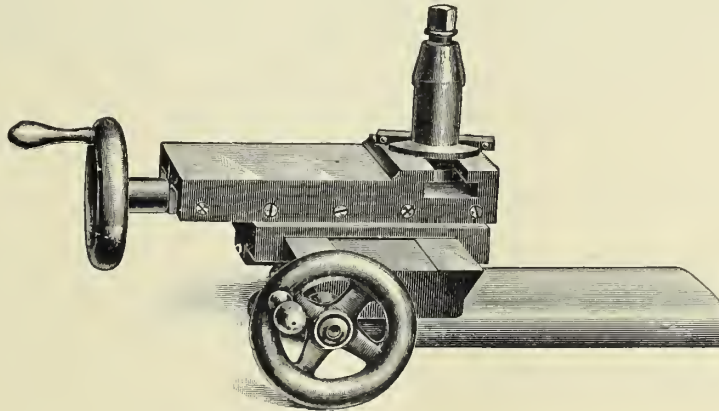
FIG. 14.



CROWN SLIDE REST.

THIS SLIDE REST may be used on any 9 or 10 inch Lathe. It is a thoroughly well made tool and very desirable for working in metals. It will turn either straight or tapering and face or square up surfaces to the full capacity of the Lathe. It has two Slides placed at right angles with each other carrying a Tool Post, which may be drawn back and forth or sideways by means of screws, allowing any position for the turning tool, and has a Bevel Rest which permits the vertical adjustment of the tool without altering its pitch. It swings the full circle on Bed Plate. The cross feed is two inches and longitudinal feed five inches. The Tool Post, Screws and Gibs are steel, and the Traverse Screws are covered. They are made in two sizes—No. 1 for 9-inch Lathes ; No. 2 for 10-inch Lathes.

FIG. 15.



SPENCER HAND LATHE SLIDE REST,

FOR LATHES FROM 11 TO 14 INCH SWING.

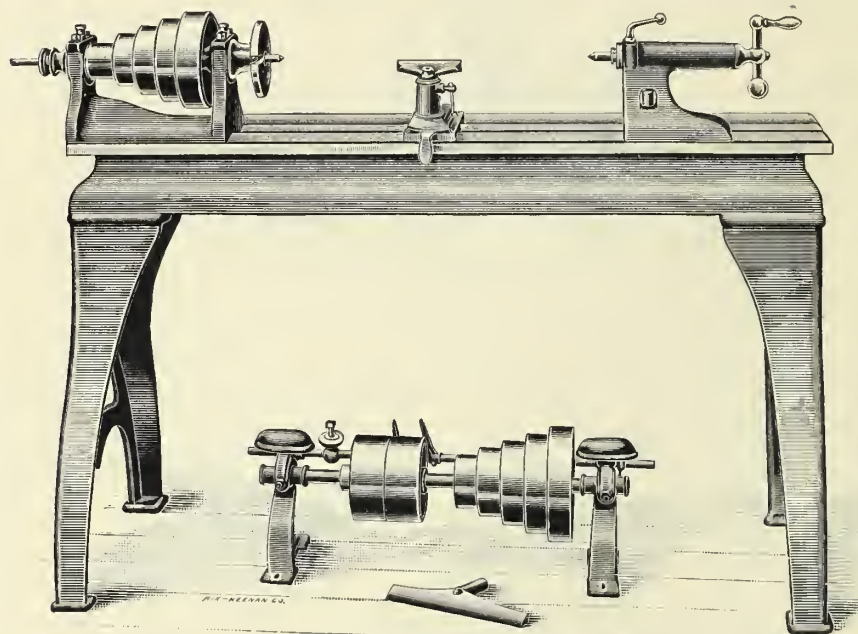
THE above cut represents a useful auxiliary tool for Hand Lathes. It is accurately constructed, easily attached and capable, within its limits, of performing work such as boring and turning equal to the Screw or Engine Lathes. There are two sizes of slide rests, one, especially designed, by reason of its height, for 11 inch Hand Lathes, and having a longitudinal travel of $7\frac{1}{8}$ inches, and a traverse travel of $3\frac{1}{4}$ inches, and weighing 30 pounds.

The other, having a longitudinal travel of 9 inches and a traverse travel of $3\frac{1}{4}$ inches and weighing 40 pounds, is used on Hand Lathes from 12 to 14 inch swing.

The slide rest for 11 inch Lathe before mentioned, can also be used on 12 and 14 inch Lathes by simply blocking it up to the required height ; with this exception, the two kinds of slide rests are exactly alike in respect to accuracy and workmanship.

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FIG. 16.



12 INCH SWING HAND OR SPEED LATHE.

THIS LATHE is made to swing 12 or 14 inches. It is furnished with a five section cone for $1\frac{3}{4}$ inch belt and has crucible steel spindles.

The spindle has a 9-16 inch hole through its entire length, and is bored to Morse taper, No. 2.

Each Lathe is provided with two T rests, wrench and plunger, for driving center out of spindle.

Countershaft has tight and loose pulleys 7 inches in diameter, 3 inch face. Revolutions per minute, 235.

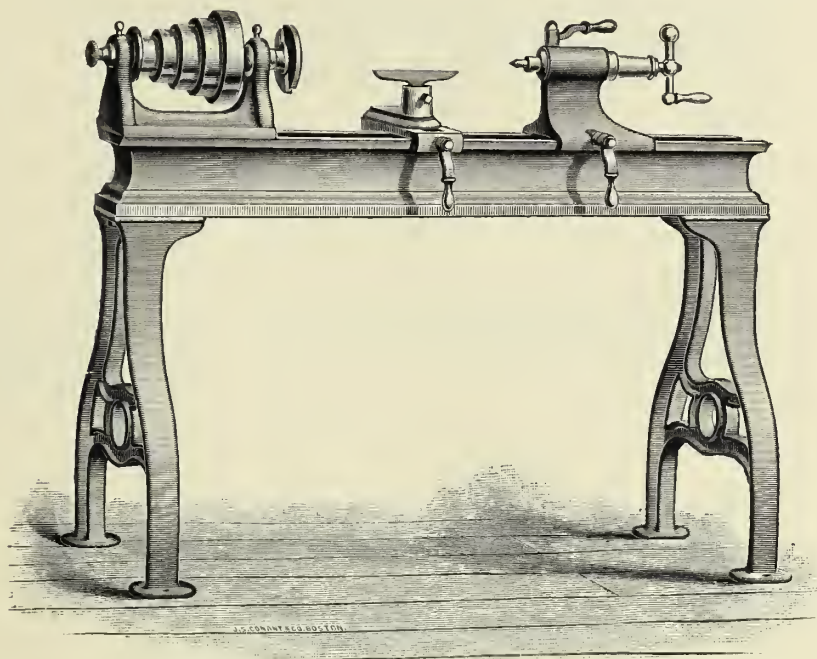
Beds of any desired length can be furnished,

SPECIFICATIONS.

		12 inches.	14 inches.
Swing of Lathe,	- - - - -	12 "	14 "
Swings over bed,	- - - - -	5 feet	6 feet
Length of bed,	- - - - -	34 inches	46 inches
Distance between centers,	- - - - -	8½ inches	
Swings over T rest,	- - - - -	500 lbs.	580 lbs.
Weight,	- - - - -		

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FIG. 17.



13 INCH SWING HAND OR SPEED LATHE.

SPECIFICATIONS.

Length of Bed.	Swing over Bed.	Swing over Rest.	Distance between Centers.	Weight.
5 feet.	13 inches.	8 inches.	2½ feet.	650
6 "	13 "	8 "	4 "	715
7 "	13 "	8 "	5½ "	780
9 "	13 "	8 "	7 "	845
10 "	13 "	8 "	8½ "	910
12 "	13 "	8 "	10 "	975

Tight and loose pulleys on counter, 8 inches diameter, $3\frac{3}{4}$ inch face.
Countershaft should make 145 revolutions per minute.



HAND OR SPEED LATHES.

SPECIFICATIONS.

16 INCH SWING HAND LATHES.

Length of Bed.	Swing over Bed.	Swing over Rest.	Distance between Centers.	Weight.
5 feet.	16 inches.	12 inches.	2 ft. 6 inches.	750 pounds.
6 "	16 "	12 "	3 " 6 "	800 "
7 "	16 "	12 "	4 " 6 "	850 "
8 "	16 "	12 "	5 " 6 "	900 "
9 "	16 "	12 "	6 " 6 "	950 "
10 "	16 "	12 "	7 " 6 "	1000 "
11 "	16 "	12 "	8 " 6 "	1050 "
12 "	16 "	12 "	9 " 6 "	1100 "

Tight and loose pulleys on counter, 10 inches diameter, $3\frac{3}{4}$ inch face.

Countershaft should make 175 revolutions per minute.

SPECIFICATIONS.

20 INCH SWING HAND LATHES.

Length of Bed.	Swing over Bed.	Swing over Rest.	Distance between Centers.	Weight.
6 feet.	20 inches.	13 inches.	3 ft. 3 inches.	1000 lbs.
8 "	20 "	13 "	5 " 3 "	1150 "
10 "	20 "	13 "	7 " 3 "	1300 "
12 "	20 "	13 "	9 " 3 "	1425 "

Tight and loose pulleys on counter, 12 inches diameter, 4 inch face.

Countershaft should make 165 revolutions per minute.

24 INCH SWING HAND LATHES.

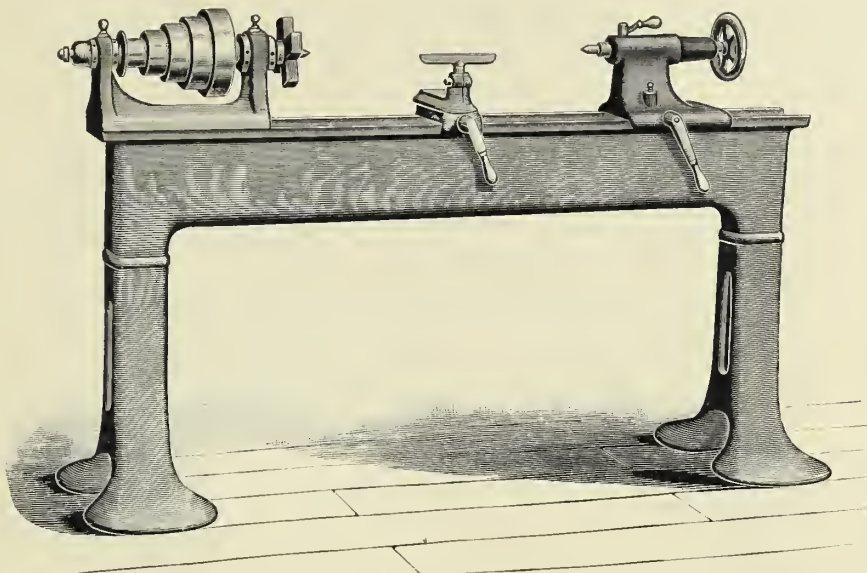
Length of Bed.	Swing over Bed.	Swing over Rest.	Distance between Centers.	Weight.
6 feet.	24 inches.			lbs.
8 "	24 "			"
10 "	24 "			"
12 "	24 "			"
14 "	24 "			"

Tight and loose pulleys on counter, 14 inches diameter, 4 inch face.

Countershaft should make 145 revolutions per minute.

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FIG. 18.



STANDARD 14 INCH HAND LATHE.

THESE LATHES are of superior design, heavy, well built, and convenient. They have patent spindle journals and boxes (same as Standard Engine Lathes), and otherwise embrace new features and improvements, are powerfully belted and furnished with balanced iron cones, cast-iron back shelves, hammered cast-steel spindles, iron beds with solid "dug-out" tops, face plates, countershafts, wrenches, T rests, and center key.

Top of beds are scraped to surface plates, and the allignment of centers are practically true.

STANDARD 12 INCH SWING HAND OR SPEED LATHE.

Length of Bed.	Swing over Bed.	Swing over Rest.	Distance between Centers.	Weight.
4 feet	12½ inches	7 inches	1 foot 8 inches	550 lbs.
5 "	12½ "	7 "	2 " 8 "	625 "
6 "	12½ "	7 "	3 " 8 "	700 "
7 "	12½ "	7 "	4 " 8 "	775 "
8 "	12½ "	7 "	5 " 8 "	850 "
9 "	12½ "	7 "	6 " 8 "	925 "
10 "	12½ "	7 "	7 " 8 "	1000 "
11 "	12½ "	7 "	8 " 8 "	1075 "

Tight and loose pulleys on counter, 7 inches diameter, 3½ inch face.

Countershaft should make 275 revolutions per minute.

Slide rest fitted to Lathe, extra.

Hollow spindle, 1⅞ inch hole, extra.

Steel drill sockets (Morse taper), No. 1, fitted to 12 inch Lathe.

Steel drill sockets (Morse taper), No. 2, fitted to 14 inch Lathe.



STANDARD 14 AND 16 INCH SWING HAND AND DRILLING LATHE.

STANDARD 14 INCH SWING HAND AND DRILLING LATHE.

Face-Plate and Centers Interchange with 14 Inch Swing Engine Lathe.

Length of Bed.	Swing over Bed.	Swing over Rest.	Distance between Centers.	Weight.
4 feet.	14 inches.	8½ inches.	1 foot 6 inches.	605
5 "	14 "	8½ "	2 " 6 "	690
6 "	14 "	8½ "	3 " 6 "	775
7 "	14 "	8½ "	4 " 6 "	860
8 "	14 "	8½ "	5 " 6 "	945
9 "	14 "	8½ "	6 " 6 "	1030
10 "	14 "	8½ "	7 " 6 "	1115
11 "	14 "	8½ "	8 " 6 "	1200

Tight and loose pulleys on counter, 7 inches diameter, 3½ inches face.
 Countershaft should make 250 revolutions per minute.
 Slide rest fitted to Lathe, extra.
 Steel drill sockets (Morse taper), fitted to Lathe.
 Hollow spindle, with $\frac{11}{16}$ inch hole.

STANDARD 16 INCH SWING HAND AND DRILLING LATHE.

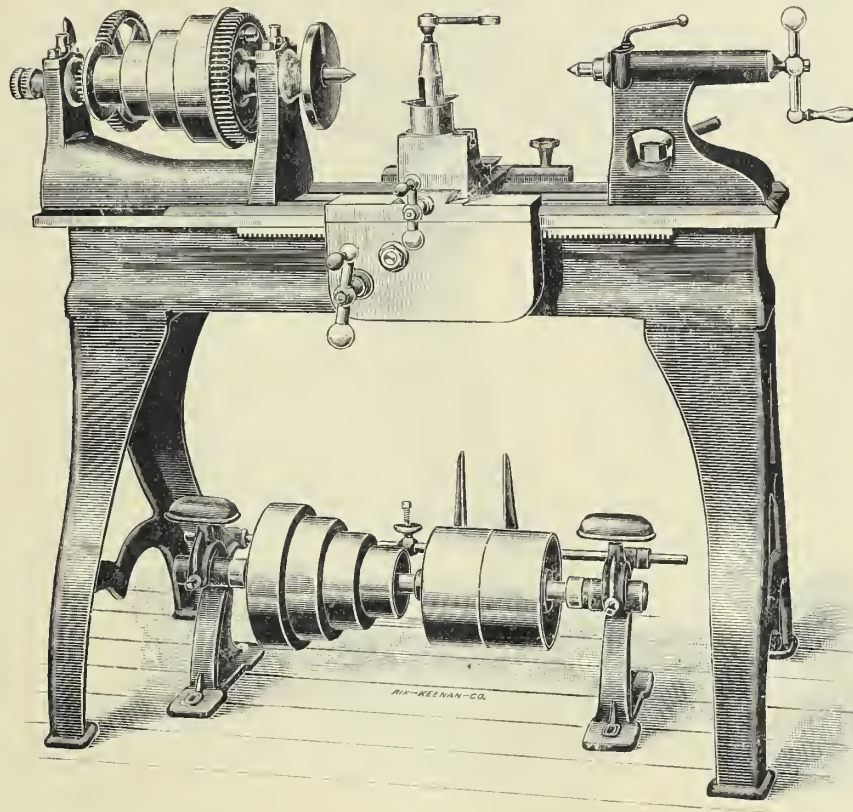
Face-Plate and Centers Interchange with 16 Inch Swing Engine Lathe.

Length of Bed.	Swing over Bed.	Swing over Rest.	Distance between Centers.	Weight.
4 feet.	16 inches.	10½ inches.	1 foot 4 inches.	655
5 "	16 "	10½ "	2 " 4 "	745
6 "	16 "	10½ "	3 " 4 "	835
7 "	16 "	10½ "	4 " 4 "	925
8 "	16 "	10½ "	5 " 4 "	1015
9 "	16 "	10½ "	6 " 4 "	1105
10 "	16 "	10½ "	7 " 4 "	1195
11 "	16 "	10½ "	8 " 4 "	1285
12 "	16 "	10½ "	9 " 4 "	1375

Tight and loose pulleys on counter, 8 inches in diameter, 3¼ inches face.
 Countershaft should make 200 revolutions per minute.
 Hollow spindle, with $\frac{11}{16}$ inch hole, extra.

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FIG. 19.

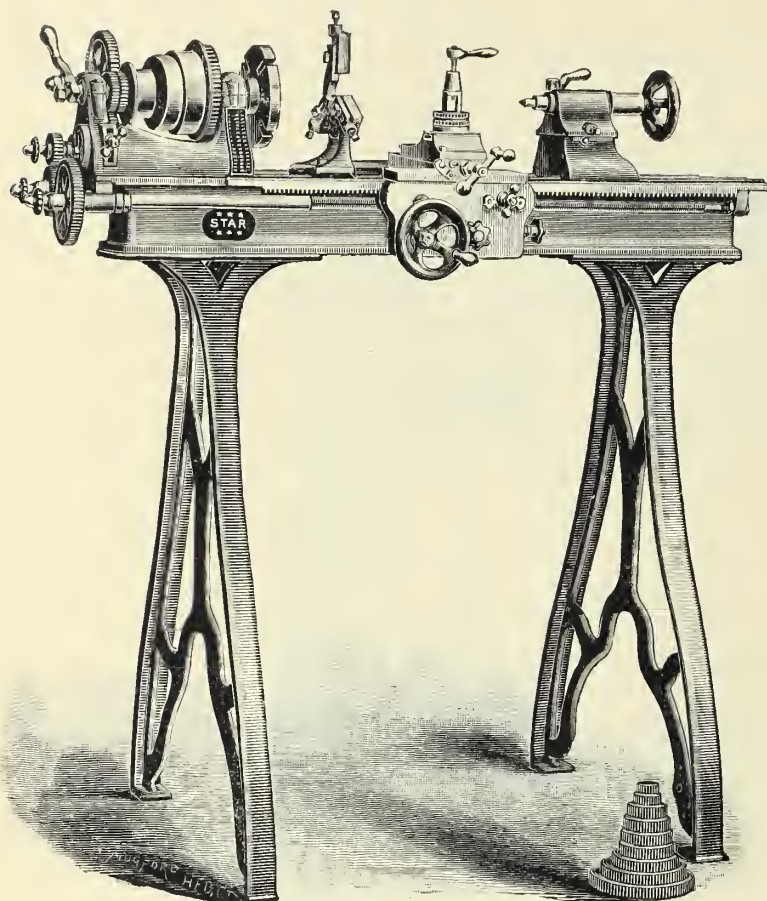


16 INCH BACK GEARED HAND LATHE,
WITH OR WITHOUT CARRIAGE.

THIS LATHE has cast crucible steel spindles. Diameter of front bearing, $1\frac{1}{16}$ inches ; diameter of back bearing, $1\frac{9}{16}$ inches. Length of front bearing, $3\frac{1}{2}$ inches. Hole through spindle, 13-16 of an inch. Centers have No. 3 Morse Taper. Diameter of face gear, $8\frac{3}{4}$ inches ; width of face gear, $1\frac{1}{8}$ inches. Largest section of cone, $8\frac{3}{4}$ inches diameter ; smallest section of cone, $3\frac{1}{2}$ inches diameter. Width of belt, $2\frac{1}{4}$ inches. Diameter of tail spindle, $1\frac{1}{2}$ inches ; travels 5 inches. When carriage slide is not wanted, a rest is furnished. We also fit this Lathe with tight and loose pulleys or friction countershaft, as desired.

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FIG. 20.



9 INCH SWING SCREW CUTTING ENGINE LATHE.

With Automatic Cross-Feed for Foot or Power.

All small parts liable to be bruised are case-hardened.

It will cut threads from 3 to 64 inclusive without compounding the gears, and any number of threads by compounding them. The lead screw is splined and for all work, except screw cutting, it simply acts as a feed rod, and therefore the only wear on its threads is in screw cutting.

The lead screw and all working screws, also the rack and all small gears are made of steel; the rack and all gears being cut by automatic machinery run smoothly.

We furnish this Lathe either with or without patent foot power.

The treadles of the foot power Lathe are movable and work independent of each other, each being connected at opposite ends of the driving wheel shaft in such a manner as to produce a strong, positive and continuous power. It can be started or stopped instantly, and may be operated with both feet when sitting, or with one foot when standing, as desired.

Each Lathe is provided with a center rest, 2 point centers, a full set of change gears to cut threads from 3 to 64, wrenches, and everything complete as shown in cut.

9 INCH SWING SCREW CUTTING ENGINE LATHE.

WITH AUTOMATIC CROSS-FEED FOR FOOT OR POWER.

THIS is a perfect back-gear screw cutting engine Lathe with automatic cross-feed, etc.

It has a broad, heavy, solid bed (with four V ways), and all other parts being proportionately heavy will take work to its full capacity without trembling or jarring.

It swings 9 inches over ways and $5\frac{1}{2}$ inches over tool carriage.

The headstock has a three-speed cone for $1\frac{1}{4}$ inch belt (and with the back-gears gives six changes of speed). It has $1\frac{1}{4}$ inch hollow steel spindle with $\frac{3}{8}$ hole and hard bronze metal boxes which are adjustable to take up the wear. The centers are standard taper, $\frac{1}{2}$ inch to the foot.

The tailstock has an adjustable side movement for turning tapers and a steel spindle with self-discharging center, also a *cam locking* arrangement.

It has patent feeding device, and is provided with both automatic cross and longitudinal feeds, which may be thrown in or out of contact by simply turning a thumb nut in the apron, and will feed right or left, cut screws right or left or can be thrown out of gear entirely by moving the lever in the headstock, without changing the motion of the foot.

The tool carriage is strongly gibbed to the bed, the rest having an automatic cross-feed, which will feed in or out, secures perfect accuracy in turning or facing up work, and with the addition of simple fixtures, which can be made by any ordinary workman, a variety of milling may be done. The carriage has a clamping device for locking it to the bed when using the cross-feed. The tool post is provided with a screw adjustment for raising and lowering the tool.

SPECIFICATIONS.

No. 1.	Swing, 9 inches.	Between centers, 25 inches.	Length of bed, 43 inches.	Weight, 333 pounds.
No. 2.	Swing, 9 inches.	Between centers, 36 inches.	Length of bed, 54 inches.	Weight, 360 pounds.

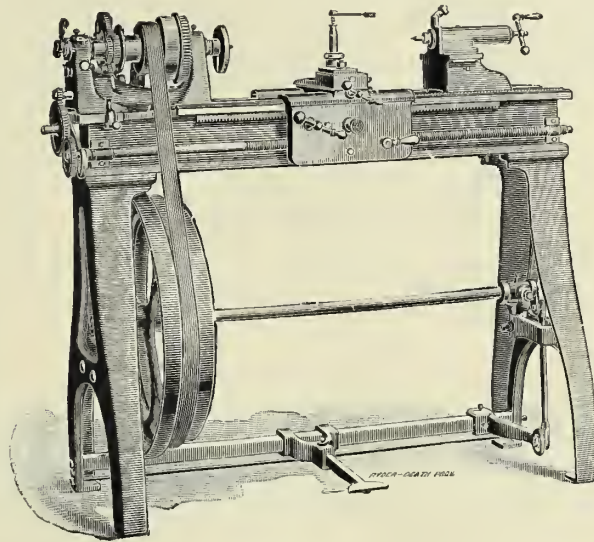
Blocking, to raise head and tailstocks and tool post to make swing 13 inches, extra.

This blocking should be filled to the Lathe before it leaves our factory.

Countershafts will be furnished in place of foot power without extra charge.

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FIG. 21.



11 INCH SWING SCREW CUTTING ENGINE LATHE.

THIS LATHE swings eleven inches over bed, seven inches over carriage and is twenty-four inches long between centers. The bed is four feet long.

Gears are furnished to cut the following threads : 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32, 36 and 40 to the inch.

Thread on screw is not used in turning as there is a friction feed for that purpose.

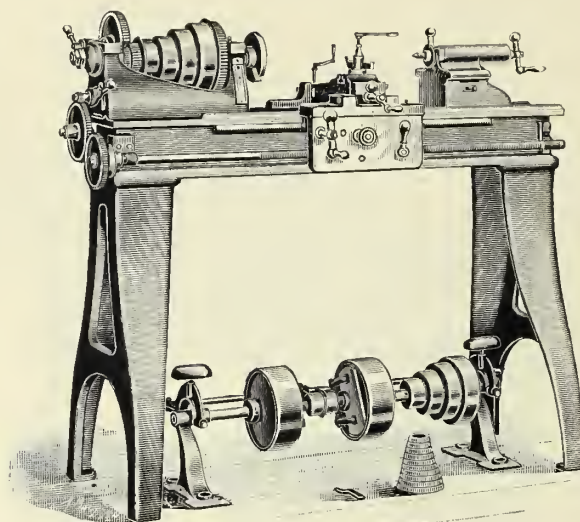
The Lathe is backgeared and has three steps on cone for $1\frac{1}{2}$ inch belt. Cross slide on carriage will square up work the full swing of Lathe.

There is a reverse motion in head stock which reverses the screw cutting, preventing the necessity of stopping the balance wheel.

Feed rack for carriage is a cut steel rack. All gears are cut from the solid. Countershaft in place of foot power will be furnished when desired. Weight, about 550 lbs.

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FIG. 22.



11 INCH SWING ENGINE LATHE.

THE above illustration represents our improved Engine Lathe with raise and fall gibbed rest. This Lathe is made from entirely new patterns, of the best materials, and in a strictly first-class manner.

It is intended to be used for accurate small work, and all parts are arranged for quick and easy operation.

The spindle is hollow and made from high grade carbon steel.

Each Lathe is furnished with a splined lead screw to which is attached a friction feed for turning; by this means the accuracy of the lead screw is preserved for screw cutting.

The Lathe can be furnished with plain gib or raise and fall rest, and with countershaft with tight and loose or friction pulleys.

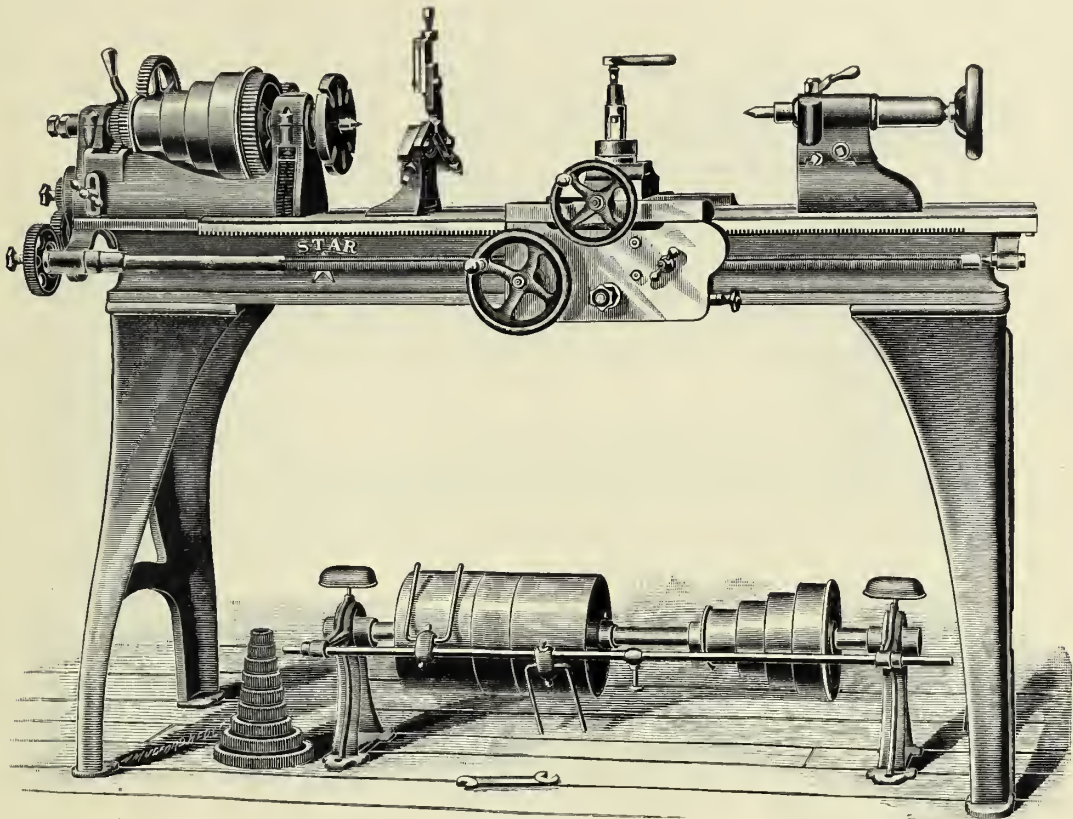
On this Lathe threads from 4 to 40 can be cut.

SPECIFICATIONS.

Swing of lathe, - - - - -	11 inches.
Swing over plain gib rest, - - - - -	7 "
Swing over raise and fall rest, - - - - -	6 "
Length of bed, - - - - -	5 feet.
Turns between centers, - - - - -	3 "
Hole through spindle, - - - - -	9-16 inch.
Number of steps on cone, - - - - -	4
Diameter of largest step, - - - - -	7 inches.
Face of cone section, - - - - -	1 5/8 "
Diameter of pulleys on countershaft, - - - - -	8 "
Revolutions of countershaft, - - - - -	225

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FIG. 23.



12 [INCH] SWING SCREW CUTTING ENGINE LATHE.

WITH AUTOMATIC CROSS-FEED FOR FOOT OR POWER.

THIS illustration represents the Lathe with special legs and countershaft as arranged when ordered with countershaft in place of foot power.

This Lathe swings 12 inches over ways and 8 inches over tool carriage.

The headstock has a four-speed cone for $1\frac{3}{4}$ inch belt (and with the back gears gives eight changes of speed); has $1\frac{7}{8}$ inch hollow steel spindle with $\frac{5}{8}$ inch hole, and hard bronze metal boxes, which are adjustable to take up the wear. The centers are standard taper $\frac{1}{2}$ inch to the foot.

It should be understood that we furnish this Lathe either with legs and foot power, or with special legs and countershaft as shown above at same price. The drive wheel on foot power, has a 4 step cone to conform to the cone pulley on headstock.

Each Lathe is provided with a center rest, 2 point centers, a full set of change gears to cut threads from 3 to 64, wrenches, and everything complete as shown in cut.

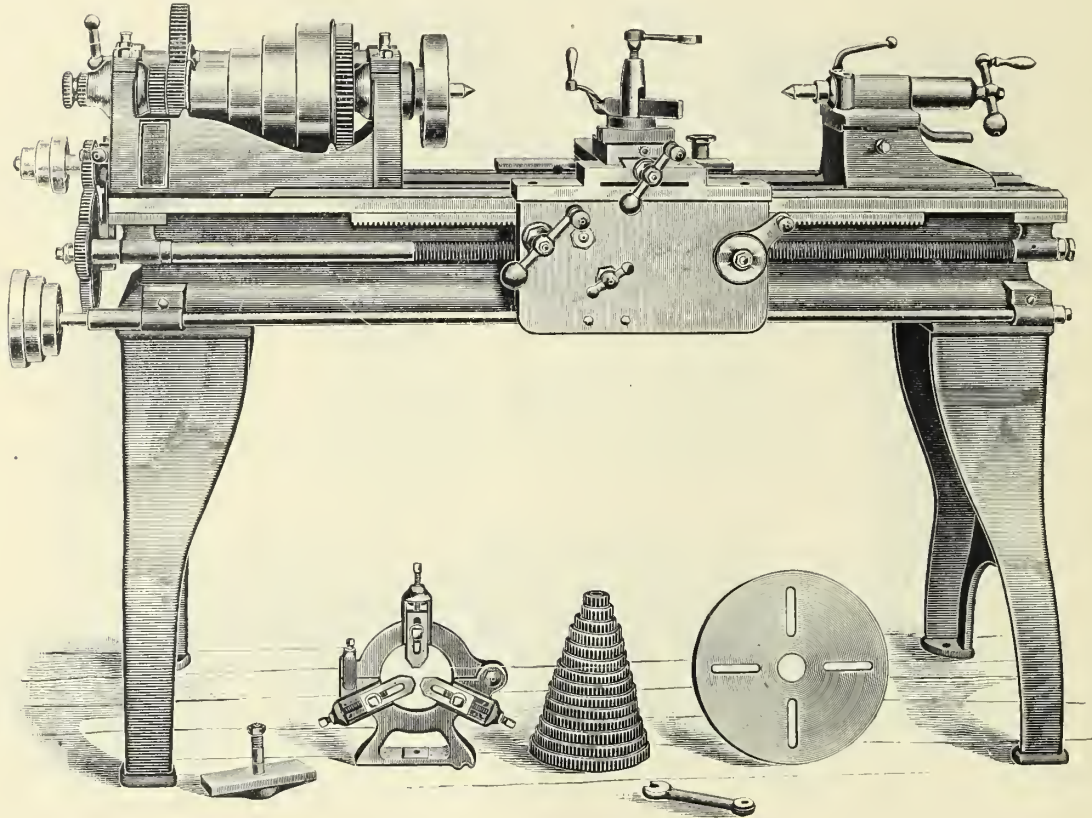
SPECIFICATIONS.

No. 5.	Swing, 12 inches.	Between centers, 36 inches.	Length of bed, 63 inches.	Weight, 660 lbs.
" 6.	" 12 "	" " 48 "	" " 75 "	" 700 "
" 7.	" 12 "	" " 60 "	" " 87 "	" 740 "

Blocking to raise head and tailstocks, and tool post to make swing 16 inches, extra. This blocking should be fitted to the Lathe before it leaves the factory.

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FIG. 24.



13 INCH SWING PRENTISS STANDARD ENGINE LATHE.

WITH RAISE AND FALL REST.

THE above cut represents our improved Standard Engine Lathe, 13 inch swing, with raise and fall rest.

This Lathe is made from entirely new patterns, much heavier than usually furnished on lathes of the same size. The design is intended to give strength as well as accuracy, and ease and quickness of operation.

Lathes are furnished with either cast iron or phosphor-bronze bearings, as desired.

All Lathes are furnished with hollow spindle made from high carbon steel.

The lead and all actuating screws, rack and pinions in apron are made of steel and cut from the solid.

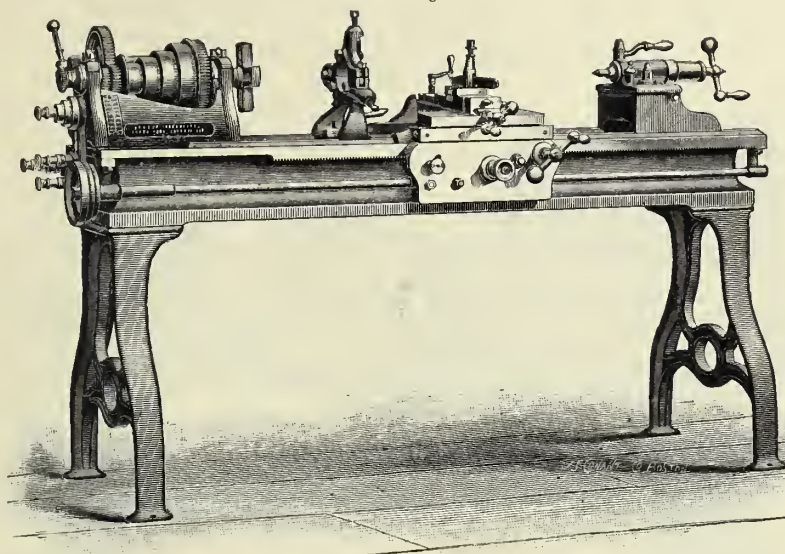
Lathes are furnished with raise and fall, plain gib or compound rests; also with taper attachment and power cross feed when required.

SPECIFICATIONS.

Swing of Lathe, - - -	13 inches	Diameter of largest step, - - -	8 inches
Swing over plain gib rest, - - -	8½ "	Face of largest step, - - -	2 "
Swing over raise and fall rest, - - -	7 "	Diameter of pulleys on countershaft, -	10 "
Length of bed, - - -	5 feet	Face of pulleys on countershaft, -	3 "
Turns between centers, - - -	26 inches	Revolutions of countershaft, -	150
Hole through spindle, - - -	¾ inch	Weight. - - -	1100
Number of steps on cone, - - -	4		

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FIG. 25.



13 INCH SWING ENGINE LATHE.

WITH SCREW CUTTING ATTACHMENTS.

SPECIFICATIONS.

GIB REST, UNLESS ORDERED WITH WEIGHTED REST.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Plain Head.	Screw Cutting.	Weight.
5 feet.	6 $\frac{3}{4}$ inches.	34 inches.	Plain.	Without.	955 lbs.
6 "	6 $\frac{3}{4}$ "	46 "	"	"	1030 "
7 "	6 $\frac{3}{4}$ "	58 "	"	"	1105 "
8 "	6 $\frac{3}{4}$ "	70 "	"	"	1180 "
5 "	6 $\frac{3}{4}$ "	34 "	Geared.	"	970 "
6 "	6 $\frac{3}{4}$ "	46 "	"	"	1045 "
7 "	6 $\frac{3}{4}$ "	58 "	"	"	1120 "
8 "	6 $\frac{3}{4}$ "	70 "	"	"	1195 "
5 "	6 $\frac{3}{4}$ "	34 "	"	With.	1020 "
6 "	6 $\frac{3}{4}$ "	46 "	"	"	1095 "
7 "	6 $\frac{3}{4}$ "	58 "	"	"	1170 "
8 "	6 $\frac{3}{4}$ "	70 "	"	"	1245 "

Pulleys on counter, 8 inch diameter, 3 $\frac{3}{4}$ inch face.

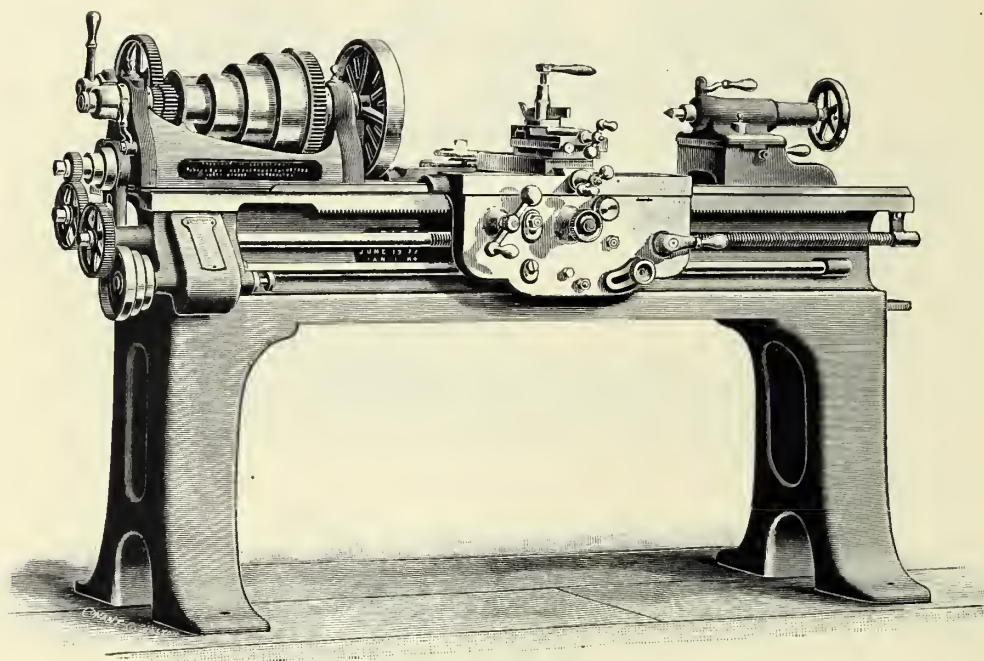
Countershaft should make 135 revolutions per minute.

Reversing speed, 165 revolutions per minute.

Power cross-feed is furnished, with compound rest or elevating rest, only when ordered.

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FIG. 26.



NEW 14 INCH SWING ENGINE LATHE.

THESE LATHES are furnished with countershafts complete, also with wrenches. All screw cutting Lathes have patent friction reversing pulleys. Screw works are made with eccentric nut for chasing, and are independent of feed works. The screws are made from an extra quality of steel, and are cut to United States Standard.

The 76 inch swing and less have hammered cast-steel spindles and superior composition or babbitt lined boxes, wrought-iron and steel handles and balances; steel racks on all Lathes below 54 inch swing, one open adjustable jawed back rest, one extra large face plate and patent friction lateral feed. 18 inch swing and above are furnished with compound rest, tool elevated by cam ring.

All these Lathes have improved inside power cross feed. 18 inch Lathes and above have an extra tool rest for turning large work. 84 and 108 inch swing may be used for turning locomotive drive wheels and other heavy work; they have compound rests with universal power feed for boring tapering holes, etc.; also have power, cross, and slide feeds. When desired, a crank-pin boring machine with quarterer can be furnished. Wrought-iron work is case hardened. Traverse rests are furnished with Lathes up to and including 18 inch swing, without extra charge.



14 AND 16 INCH SWING ENGINE LATHE.

SPECIFICATIONS.

14 INCH SWING ENGINE LATHE.

Actual Swing, 15 Inches.

Solid or Hollow Spindle. Hollow Spindle has 1 1-32 Inch Hole.				
Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
5 feet	6 1/4 inches	2 feet 2 inches	Without	1795
6 "	6 1/4 "	3 " 2 "	"	1935
7 "	6 1/4 "	4 " 2 "	"	2075
8 "	6 1/4 "	5 " 2 "	"	2215
9 "	6 1/4 "	6 " 2 "	"	2355
10 "	6 1/4 "	7 " 2 "	"	2495
11 "	6 1/4 "	8 " 2 "	"	2635
12 "	6 1/4 "	9 " 2 "	"	2775
13 "	6 1/4 "	10 " 2 "	"	2915
5 "	6 1/4 "	2 " 2 "	With	1880
6 "	6 1/4 "	3 " 2 "	"	2020
7 "	6 1/4 "	4 " 2 "	"	2160
8 "	6 1/4 "	5 " 2 "	"	2800
9 "	6 1/4 "	6 " 2 "	"	2440
10 "	6 1/4 "	7 " 2 "	"	2580
11 "	6 1/4 "	8 " 2 "	"	2720
12 "	6 1/4 "	9 " 2 "	"	2860
13 "	6 1/4 "	10 " 2 "	"	3000

With Taper Attachment.

Furnished with 4 or 5 step cone (2 1/2 inch and 2 inch belt).

Compound rest furnished when ordered. Swing over carriage, 9 1/8 inches.

Range of screw cutting, 4 to 36 to inch.

A taper attachment can be furnished for this Lathe if wanted.

Taper attachment, extra.

Pulleys on counter are 10 ins. diameter, 3 3/4 ins. face.

Countershaft should make 95 revolutions per minute.

Reversing speed, 105 revolutions per minute.

16 INCH SWING ENGINE LATHE.

Actual Swing 17 Inches.

Solid or Hollow Spindle. Hollow Spindle has 1 1-32 Inch Hole.				
Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
6 feet	8 1/4 inches	2 feet 7 inches	Without	2160
7 "	8 1/4 "	3 " 7 "	"	2310
8 "	8 1/4 "	4 " 7 "	"	2460
9 "	8 1/4 "	5 " 7 "	"	2610
10 "	8 1/4 "	6 " 7 "	"	2760
11 "	8 1/4 "	7 " 7 "	"	2910
12 "	8 1/4 "	8 " 7 "	"	3060
13 "	8 1/4 "	9 " 7 "	"	3210
14 "	8 1/4 "	10 " 7 "	"	3360
15 "	8 1/4 "	11 " 7 "	"	3510
6 "	8 1/4 "	2 " 7 "	With	2250
7 "	8 1/4 "	3 " 7 "	"	2400
8 "	8 1/4 "	4 " 7 "	"	2550
9 "	8 1/4 "	5 " 7 "	"	2700
10 "	8 1/4 "	6 " 7 "	"	2850
11 "	8 1/4 "	7 " 7 "	"	3000
12 "	8 1/4 "	8 " 7 "	"	3150
13 "	8 1/4 "	9 " 7 "	"	3300
14 "	8 1/4 "	10 " 7 "	"	3450
15 "	8 1/4 "	11 " 7 "	"	3600

With Taper Attachment.

Furnished with 4 or 5 step cone (3 1/4 inch and 2 1/2 inch belt).

Compound rest furnished when ordered. Swing over carriage, 11 inches.

Range of screw cutting, 3 to 36 per inch.

Taper attachment, extra.

Pulleys on counter are 12 ins. diameter, 3 3/4 ins. face.

Countershaft should make 90 revolutions per minute.

Reversing speed, 100 revolutions per minute.

Patent combination (English and Metric), screw cutting, extra.

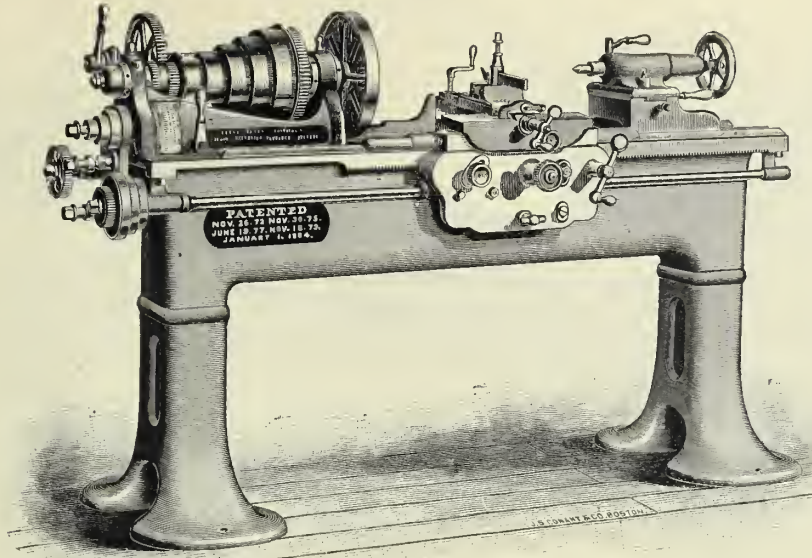


PUTNAM STANDARD ENGINE LATHES.

THESE LATHES are symmetrical and attractive in outline, combining in construction patented improvements and features of originality. They are heavy, powerful, accurate, durable, recommended for general excellence, are manufactured to *standard gauges*, and are *practically* interchangeable. Headstock spindles are *hammered steel* of *high grade*. Cones, gears and journals are of *large proportions*, the latter being finished with unusual care and accuracy. The *patent spindle boxes* we advocate as the *best*, and superior in *every respect* to the common Lathe box; they are susceptible of easy and fine adjustment; are rigid and extremely durable, and retain the live spindle in a *central line*, vertically, longitudinally and relatively to the dead spindle; are easily and quickly duplicated *without refitting* or otherwise *disturbing other parts of the Lathe*. Lathe carriages are rigid and have an unusual wearing surface on the "ways;" are gibbed to the *outside* and *inside* of Lathe-bed. The compound rests are recommended as best adapted to heavy *face-plate work* or *boring*, while the *elevating carriage*, with its *ball and socket* joint, is superior to all other devices for rapid, easy and delicate adjustment of the cutting tool, and is best adapted to fine work or miscellaneous fitting. Screw-cutting works are of improved construction and cover a wide range, are accurate, strong and *independent of feed works*. Lead screws are made from *steel of a special grade*, and finished with care and *precision*. Tailstocks are of extra length at base, have *improved adjustable spring rolls*, tool shelf, center oiler, split binder, and *patent cam screw anchor bolts*, which are not equalled in *convenience* or *effectiveness*. Feed works are powerful, quick and give a uniform steadiness of action to the carriage. The *patent friction feed* at all times imparting an easy and positive motion. Feeds are operated by either belt or gears, thus producing an almost unlimited range. Lathes up to 20-inch swing (inclusive) are furnished with either *elevating carriages* or *compound rests*. 24 inch swing Lathes have compound rests (graduated swivels), with case-hardened step-ring for elevating tool. All Lathes will *face up* their full-rated swing, *without change of tool*, and are practically perfect in the qualities of *facing, boring and turning*. The alignment of centers is reliable at all positions of tailstock. Lathes are furnished with *improved lateral feed*, automatic cross-feed, steel racks and pinions, balanced iron cones, open adjustable three-jawed back rest, with swivel joint and handle lock-nut, traverse rests up to and including 18 inch swing, are furnished without extra cost; large circular face-plates, dog face-plates, wrenches, and countershafts. All screw-cutting Lathes are driven by *patent friction* pulleys of improved construction. Handles and balances are forged from the best refined iron. All work, so required, is tempered or case-hardened. 20 inch swing Lathes and above have *side blocks* for turning *full swing of Lathe*. Lathe-beds are *strong* and *stiff*, being braced by *cross-ribs* and *patent central truss-rib*, which is cast solid to the bed and extends from end to end. Graduation of speeds on all geared Lathes are in uniform progression. All screw-cutting Lathes are furnished with finished iron cones and improved patent friction driving pulleys on countershaft. Lathes without screw-cutting attachment have tight and loose pulleys on countershaft. Live and dead centers on *all Lathes* are made from a *fine quality of hammered tool steel*, skilfully fitted to spindles, pointed, properly tempered, and finished *ready for use*.

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FIG. 27.



PUTNAM STANDARD 14 INCH SWING ENGINE LATHE.

Note.—Cut does not illustrate latest type of Lathe, see Photo. These Lathes have our new compound reversing gear stud for Screw Cutting.

STANDARD 14 INCH SWING ENGINE LATHE.

Actual Swing, 15 Inches.

Solid or Hollow Spindle. Hollow Spindle, 1 1-32 Inch Hole.				
Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
5 feet	6 1/4 inches	2 feet 10 inches	Without	1795
6 "	6 1/4 "	3 " 10 "	"	1935
7 "	6 1/4 "	4 " 10 "	"	2075
8 "	6 1/4 "	5 " 10 "	"	2115
9 "	6 1/4 "	6 " 10 "	"	2355
10 "	6 1/4 "	7 " 10 "	"	2495
11 "	6 1/4 "	8 " 10 "	"	2935
12 "	6 1/4 "	9 " 10 "	"	2775
13 "	6 1/4 "	10 " 10 "	"	2919
5 "	6 1/4 "	2 " 10 "	With	1880
6 "	6 1/4 "	3 " 10 "	"	2020
7 "	6 1/4 "	4 " 10 "	"	2160
8 "	6 1/4 "	5 " 10 "	"	2300
9 "	6 1/4 "	6 " 10 "	"	2440
10 "	6 1/4 "	7 " 10 "	"	2580
11 "	6 1/4 "	8 " 10 "	"	2720
12 "	6 1/4 "	9 " 10 "	"	2860
13 "	6 1/4 "	10 " 10 "	"	3000

With Taper Attachment.

Furnished with 4 or 5 step cone, 2 1/2 inch and 2 inch belt.
Compound rest furnished when ordered. Swing over carriage, 9 1/2 inches.
Range of screw cutting, one thread in 2 1/4 inches to 36 per inch.
Gears to cut even numbers up to 64 per inch, extra.
Range of feed, 1/16 to 1 inch to one revolution of spindle.
Taper attachment, extra.
Pulleys on counter are 10 inches diameter, 3 1/4 inches face.
Countershafts should make 95 revolutions per minute.
Reversing speed, 105 revolutions per minute.

STANDARD 16 INCH SWING ENGINE LATHE

Actual Swing, 17 Inches.

Solid or Hollow Spindle. Hollow Spindle, 1 9-32 Inch Hole.				
Length of Bed	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
6 feet	8 1/4 inches	2 feet 7 inches	Without	2160
7 "	8 1/4 "	3 " 7 "	"	2310
8 "	8 1/4 "	4 " 7 "	"	2460
9 "	8 1/4 "	5 " 7 "	"	2610
10 "	8 1/4 "	6 " 7 "	"	2760
11 "	8 1/4 "	7 " 7 "	"	2910
12 "	8 1/4 "	8 " 7 "	"	3060
13 "	8 1/4 "	9 " 7 "	"	3210
14 "	8 1/4 "	10 " 7 "	"	3360
15 "	8 1/4 "	11 " 7 "	"	3510
6 "	8 1/4 "	2 " 7 "	With	2250
7 "	8 1/4 "	3 " 7 "	"	2400
8 "	8 1/4 "	4 " 7 "	"	2550
9 "	8 1/4 "	5 " 7 "	"	2700
10 "	8 1/4 "	6 " 7 "	"	2850
11 "	8 1/4 "	7 " 7 "	"	3000
12 "	8 1/4 "	8 " 7 "	"	3150
13 "	8 1/4 "	9 " 7 "	"	3300
14 "	8 1/4 "	10 " 7 "	"	3450
15 "	8 1/4 "	11 " 7 "	"	3600

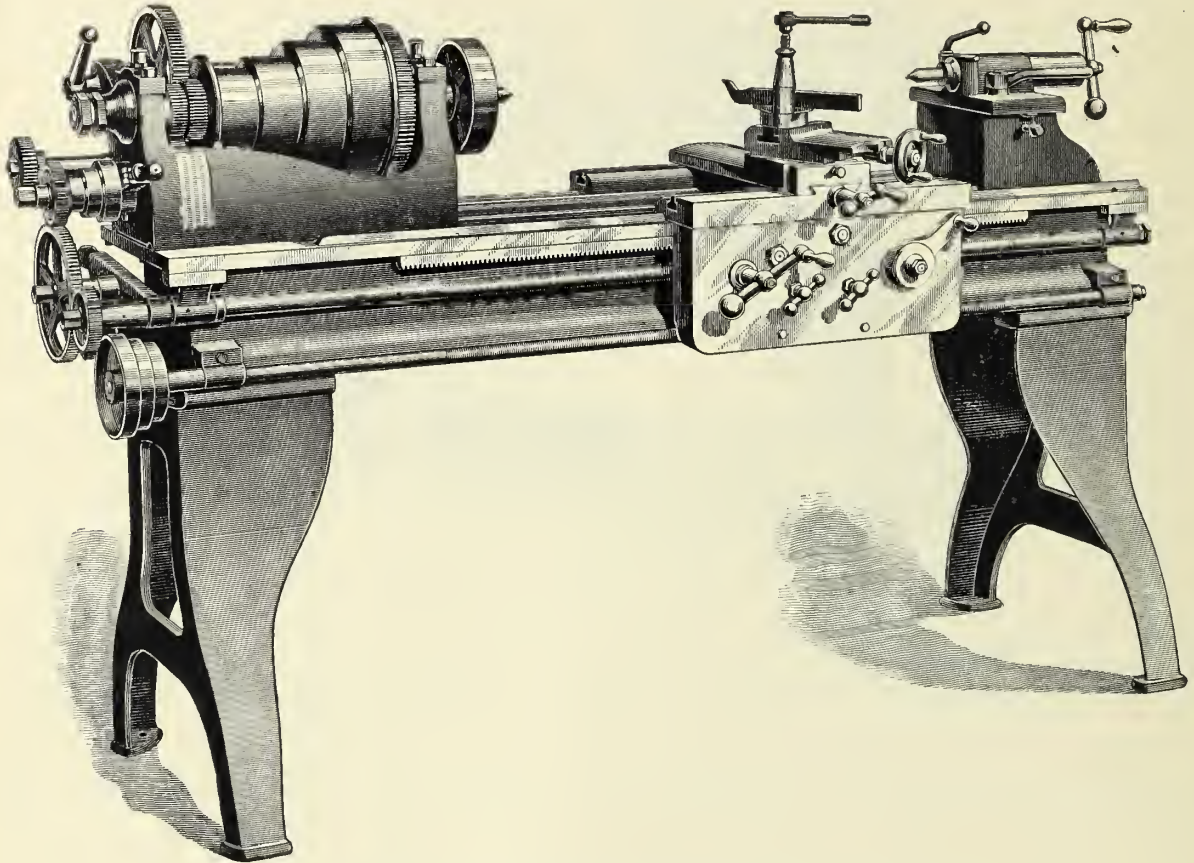
With Taper Attachment.

Furnished with 4 or 5 step cone, 3 1/4 inch and 2 1/2 inch belt.
Compound rest furnished when ordered. Swing over carriage, 11 inches.
Range of screw cutting, one thread in 2 1/4 inches to 36 per inch.
Gears to cut even numbers up to 64 per inch, extra.
Range of feed, 1/16 to 1 inch to one revolution of spindle.
Taper attachment, extra.
Pulleys on counter are 12 inches diameter, 3 1/4 inches face.
Countershaft should make 90 revolutions per minute.
Reversing speed, 100 revolutions per minute.

Patent combination (English and Metric), screw cutting, extra.

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FIG. 28.



14 AND 16 INCH SWING PRENTISS STANDARD ENGINE LATHE,

WITH COMPOUND REST AND AUTOMATIC CROSS FEED.

THE above cut represents our improved Standard Engine Lathes, 14 and 16 inch swing, with compound rest and automatic cross feed.

These Lathes are made from new patterns throughout. The design is intended to give strength and rigidity, as well as accuracy, ease and quickness of operation.

Lathes are furnished with either cast iron or phosphor-bronze bearings.

Spindles are hollow and made of hammered high grade carbon steel.

The lead and all actuating screws, rack and pinions in apron, are made of steel and cut from the solid.

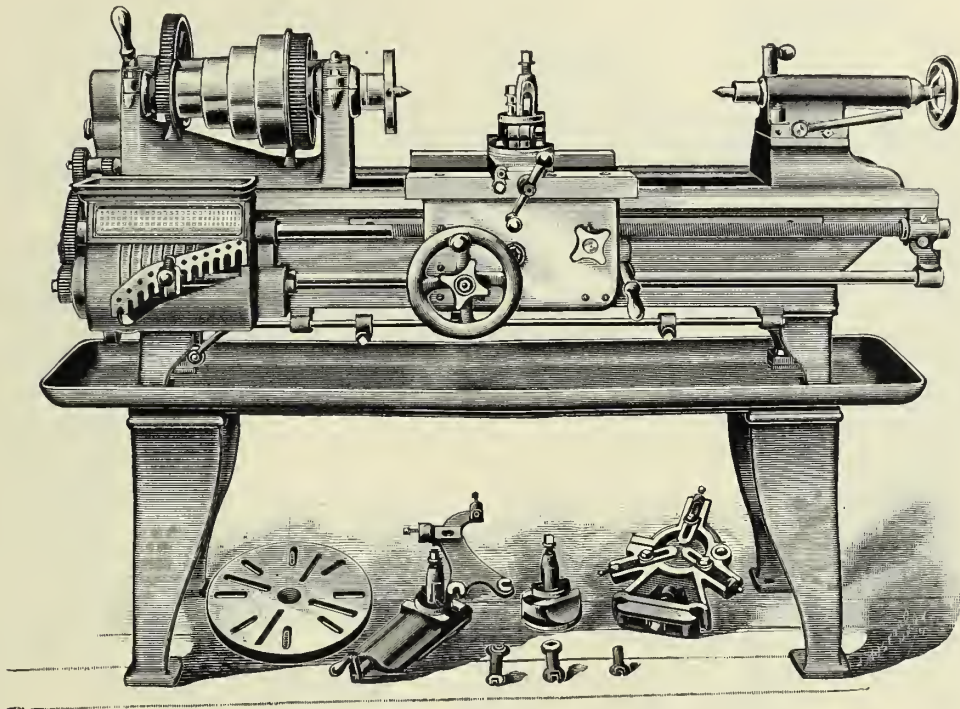
All Lathes have automatic cross feed, and can be furnished with raise and fall, plain gib, or compound rest; also taper attachments, if wanted.

SPECIFICATIONS.

Swing of Lathe, - - -	14 ins.	16 ins.	Face, - - - - -	2 1/8 ins.	2 5/8 ins.
Swing over plain gib rest, - -	9 3/4 "	11 1/2 "	Diam. of pulleys on countershaft, 10	"	11 "
Swing over raise and fall rest, -	7 3/4 "	9 "	Width of belt, - - -	3 "	3 "
Length of bed, - - -	6 feet	6 feet	Revolutions of countershaft, 140		120
Turns between centers, - - -	3 feet 3 ins.	3 feet	Weight, - - - - -	1300 lbs.	1550 lbs.
Number of steps on cone, - - -	4		Can furnish any length bed up to	10 feet	12 feet
Diameter of largest step, - - -	8 1/2 ins.	9 1/2 ins.			

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FIG. 29.



14 INCH SWING, 6 FOOT BED WITH OIL PAN, AND AUTOMATIC STOP FOR FEED.

THE above illustration shows the Lathe fitted with pan under it for the reception of chips from the turning. It is also an advantage in case oil is used on the Lathe, making it useful as a screw machine. This Lathe can be arranged to use the drawing-in chucks as used on Watch Lathes for small work. This pan is fitted to five and six foot beds only.

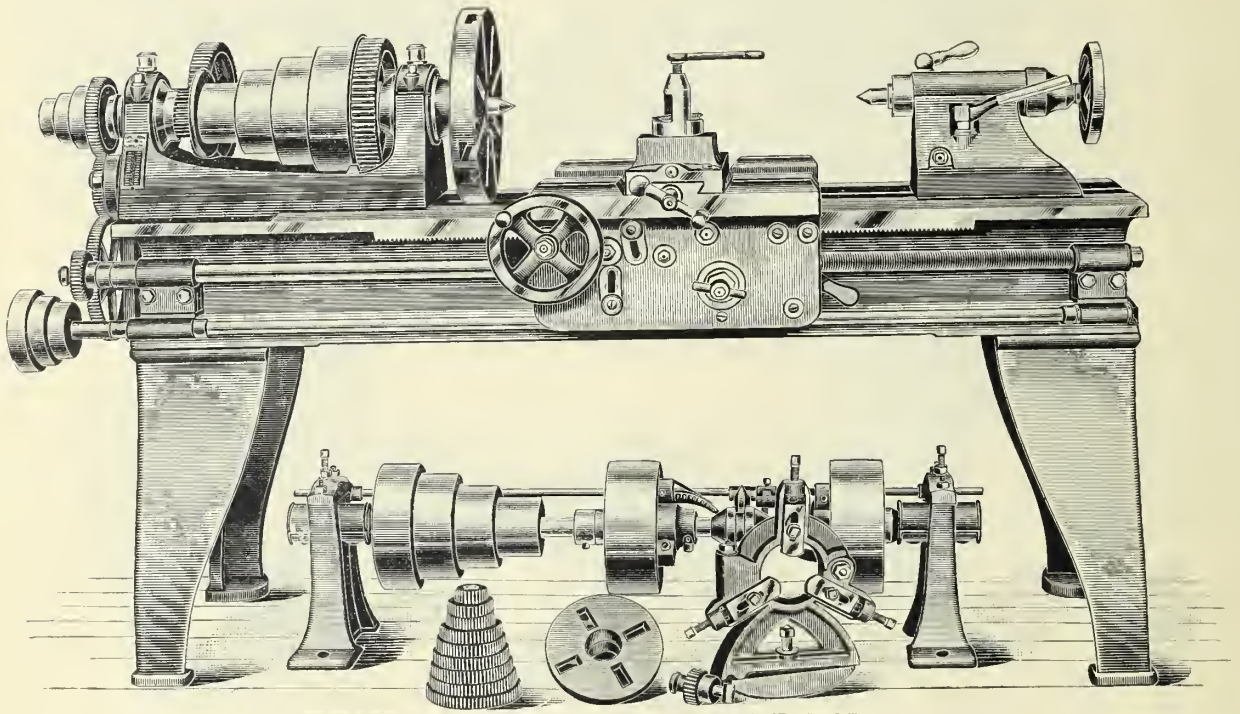
We furnish' this Lathe with Compound or Homan rest, with power cross feed at slight extra cost.

SPECIFICATIONS.

Swing, - - - - -	4 inches	Diameter of tail spindle, - - -	1 $\frac{3}{8}$ inches
Proportion of gearing in the head, - -	8 $\frac{1}{2}$ to 1	Cuts screws from, - - -	1 $\frac{1}{2}$ to 80 per inch
Cone diameters, - - -	3 $\frac{3}{8}$, 5 $\frac{1}{4}$, 6 $\frac{3}{8}$, 8 $\frac{1}{2}$	Feeds, per inch, - - -	10 $\frac{1}{2}$ to 560
Width of belt, - - -	2 inches	Size of pulleys on countershaft, -	9 in. dia. x 3 in. face
Hole through the spindle, - - -	1 inch	6 ft. Lathe takes in between centers, -	40 inches
Front bearing, - - -	2 in. dia. x 3 $\frac{3}{4}$ in. long	Lengths of bed, - - -	5, 6, 7, 8, and 10 feet
Back bearing, - - -	1 $\frac{1}{2}$ in. dia. x 2 $\frac{1}{2}$ in. long		

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FIG. 30.

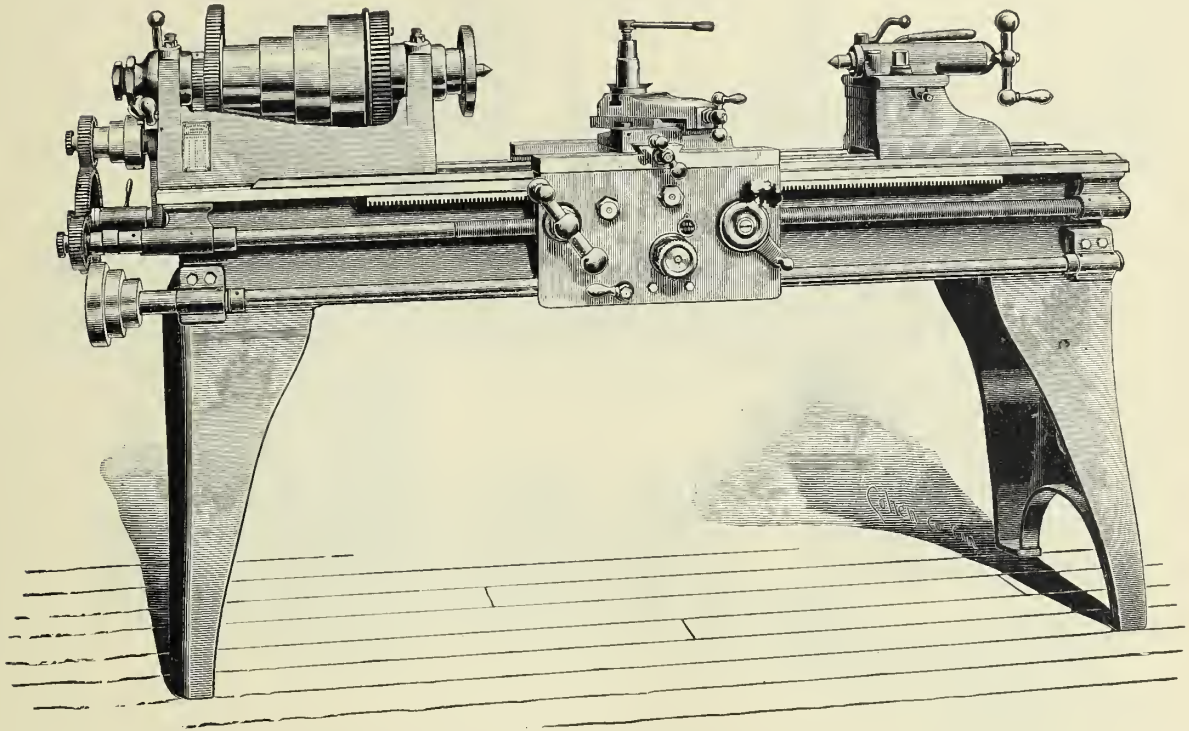


16 INCH SWING HOLLOW SPINDLE ENGINE LATHE.

THIS LATHE swings 16 inches over bed and 10 inches over carriage. Head spindle, front bearing, $2\frac{1}{4} \times 5$ inches. Hole through head spindle, $1\frac{5}{16}$ inches. Centers, Morse taper, No. 4. Tail spindle, $1\frac{7}{8}$ inches in diameter. Conc, four steps for $2\frac{3}{4}$ inch belt; largest step 10 inches. Geared, 11 to 1. Distance between centers, 6 feet; bed, 30 inches. Weight on 6 foot bed, 1800 pounds. Carriage has power cross-feed and both feeds are controlled by one friction, the change from one feed to the other being by the upper knob shown to the right of the hand wheel. The knob below this reverses the direction of either feed and does away with the annoyance of reversing gears in the headstock. The countershaft has two $10 \times 3\frac{1}{2}$ inches friction pulleys which should run 140 revolutions per minute, and is furnished with self-oiling hangers.

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FIG. 31.



16 INCH SWING ENGINE LATHE, WITH HOLLOW SPINDLE.

THIS Lathe has hollow spindle in the head with large boxes and long bearings.

Head is strongly back-geared with a cross of 8 and 10 pitch, which prevents chatter.

Has steel feed-rod and leading-screw, with open and shut nut and steel worm.

Cuts threads 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 26, 28, 30.

Has 10 pitch steel rack, with steel pinion running in it; also steel rocker-gears in the head.

Cone has 4 sections, $9\frac{1}{8}$, $7\frac{7}{8}$, $6\frac{1}{2}$, $4\frac{3}{8}$ inches by $2\frac{1}{2}$ inches face.

Front bearings on spindle $5\frac{3}{8}$ inches long by $2\frac{7}{8}$ inches in diameter.

Back bearings 3 inches long by $1\frac{5}{8}$ inches in diameter.

Centers conform to Morse taper No. 3.

Swing over ways, 16 inches; swing over rest, 10 inches.

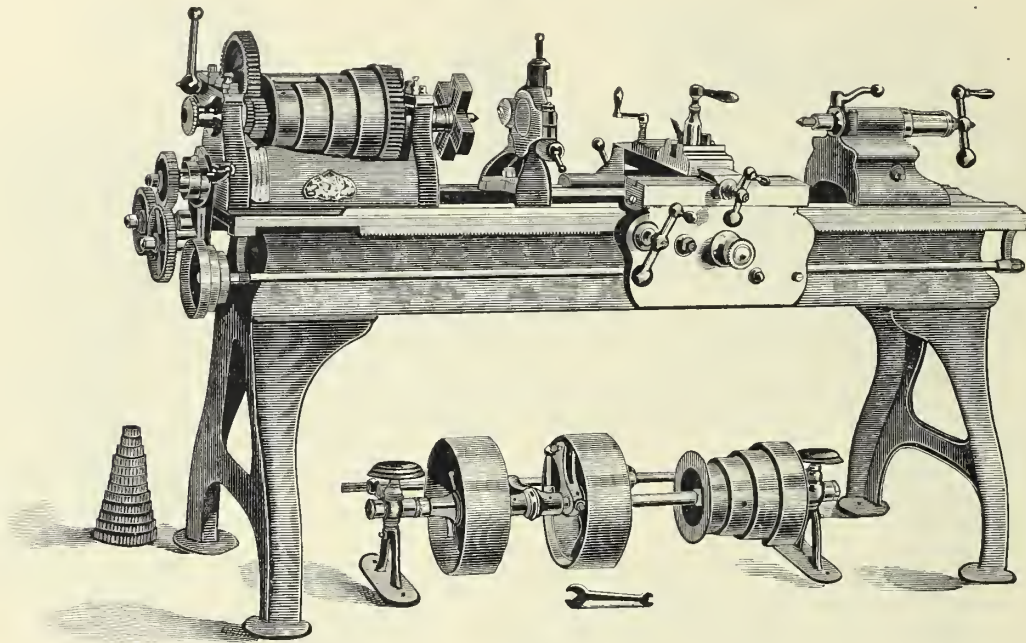
Distance between centers, 3 feet 2 inches.

Has friction countershaft, with pulleys 10 inches in diameter and $2\frac{3}{4}$ inch face.

We make this Lathe with either raise and fall back gibbed rest, plain gibbed rest with power cross-feed, or compound rest with power cross-feed. The outfit of each Lathe is 1 large and 1 small faceplate, 1 center-rest, 2 centers of tool-steel, a set of change gears to cut the above threads, countershaft, and necessary wrenches.

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FIG 32.



17 INCH SWING ENGINE LATHE, ON 6 FOOT BED.

THE above illustration represents a 17 inch Swing Engine Lathe on 6 foot bed, with rise and fall gibbed carriage.

These Lathes are screw cutting, rod feed, and power cross feed, with 11-16 inch hollow spindle. The spindles are *forged* steel and run in bronze metal boxes; the lead screw, feed rod, feed rack and pinion gear for same, as well as all working screws, are *steel*, the rack and pinion being cut from the solid.

They are built with beds, as desired, up to and including 12 feet in length. Each are furnished with large and small face plate, center rest, full set of screw gears, counter shaft with friction pulleys, wrenches, etc., etc. The raise and fall gibbed carriage will be sent unless otherwise ordered, but will substitute the plain gibbed carriage at same price or the compound rest at special price.

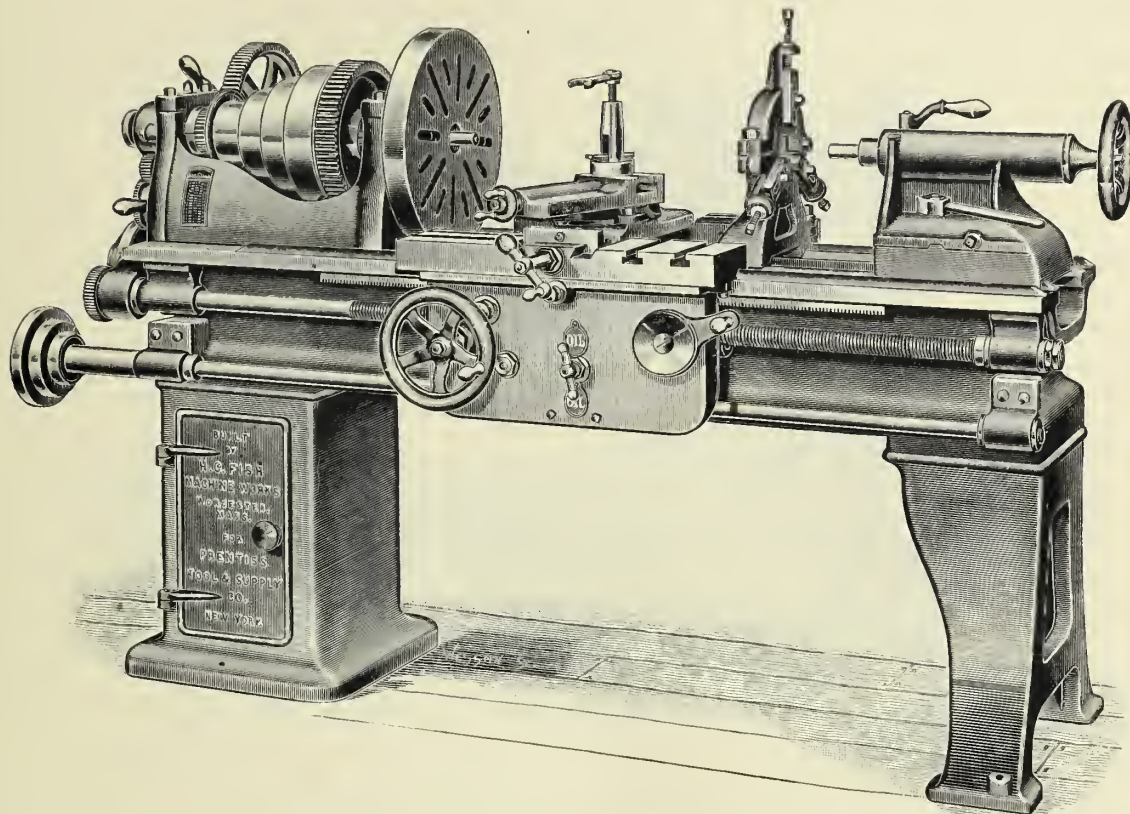
SPECIFICATIONS.

This Lathe will take 3 feet between centers and swing about $7\frac{1}{2}$ inches over the raise and fall carriage, and $9\frac{1}{2}$ inches over the plain or solid carriage and the same when the compound rest is used. The front bearing to spindle is $2 \times 3\frac{3}{4}$; the cones carry a $2\frac{1}{2}$ inch belt; the friction pulleys on counter are 12×3 inches and should make about 140 revolutions per minutes.

Weight, complete on 6 foot bed, about 1700 pounds.

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FIG. 33.



18 INCH SWING PRENTISS STANDARD ENGINE LATHE.

THE above cut represents our improved 18 inch engine Lathe. This Lathe is designed for either light or heavy work ; the journals are large and carefully finished, the front bearing being $2\frac{1}{8}$ inches diameter by $4\frac{3}{4}$ inches long.

The spindle is made of hammered crucible steel and has a $1\frac{5}{8}$ inch hole through its entire length.

The boxes are of hard phosphor bronze, and are so *designed* that new ones can be substituted at any time, and easily set in perfect alignment.

The lead screw and all actuating screws are made of a special grade of steel.

The carriage has an extra long bearing on ways and the tool-block also has a long bearing on carriage.

A taper attachment can be furnished when required.

Provision is made for withdrawing the pinion from rack when screw cutting, which also prevents the possibility of engaging both feeds at the same time.

The cabinet leg is fitted with a box with separate places for each of the change gears, wrenches, etc.

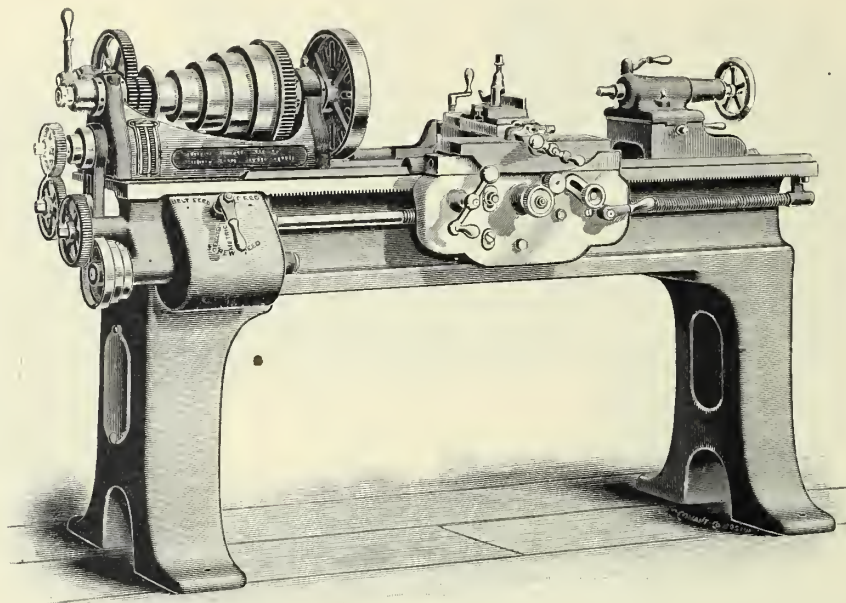
Each Lathe is furnished with large and small face plates, steady rest, set of change gears for screw cutting (including $11\frac{1}{2}$ threads for pipe) and friction countershaft, and with plain gib or compound rest as required.

SPECIFICATIONS.

Size of Lathe, - - -	18 inches	Diameter of large step, - - -	11 inches
Swing of Lathe, - - -	$18\frac{1}{2}$ inches	Cuts threads - - -	2 to 20 inches
Swing over carriage, - - -	$11\frac{1}{2}$ inches	Diameter of pulleys on countershaft, - - -	12 inches
Length of bed, - - -	6 feet	Width of pulleys on countershaft, - - -	4 inches
Turns between centers, -	2 feet 7 inches	Revolutions of countershaft, - - -	130
Number of steps on cone, -	4	Weight, - - -	2400 lbs.
Face of steps on cone, - -	$2\frac{3}{8}$ inches		

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FIG. 34.



18 INCH SWING ENGINE LATHE.

ILLUSTRATION shows patent combination English and metric screw cutting as applied to 14, 16, 18 and 20 inch Lathes of this class.

Actual Swing, 19 Inches. Solid or Hollow Spindle. Hollow Spindle, 1 7-16 Inch Hole.

Length of Bed	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
6 feet.	12 1/2 inches.	2 feet 1/2 inch.	Without.	3180	6 feet.	12 1/2 inches.	2 feet 1/2 inch.	With.	3300
7 "	12 1/2 "	3 " 1/2 "	"	3345	7 "	12 1/2 "	3 " 1/2 "	"	3465
8 "	12 1/2 "	4 " 1/2 "	"	3510	8 "	12 1/2 "	4 " 1/2 "	"	3630
9 "	12 1/2 "	5 " 1/2 "	"	3675	9 "	12 1/2 "	5 " 1/2 "	"	3795
10 "	12 1/2 "	6 " 1/2 "	"	3840	10 "	12 1/2 "	6 " 1/2 "	"	3960
11 "	12 1/2 "	7 " 1/2 "	"	4005	11 "	12 1/2 "	7 " 1/2 "	"	4125
12 "	12 1/2 "	8 " 1/2 "	"	4170	12 "	12 1/2 "	8 " 1/2 "	"	4295
13 "	12 1/2 "	9 " 1/2 "	"	4335	13 "	12 1/2 "	9 " 1/2 "	"	4455
14 "	12 1/2 "	10 " 1/2 "	"	4500	14 "	12 1/2 "	10 " 1/2 "	"	4620
15 "	12 1/2 "	11 " 1/2 "	"	4665	15 "	12 1/2 "	11 " 1/2 "	"	4785
16 "	12 1/2 "	12 " 1/2 "	"	4830	16 "	12 1/2 "	12 " 1/2 "	"	4950
17 "	12 1/2 "	13 " 1/2 "	"	4995	17 "	12 1/2 "	13 " 1/2 "	"	5115

With Taper Attachment.

With Taper Attachment.

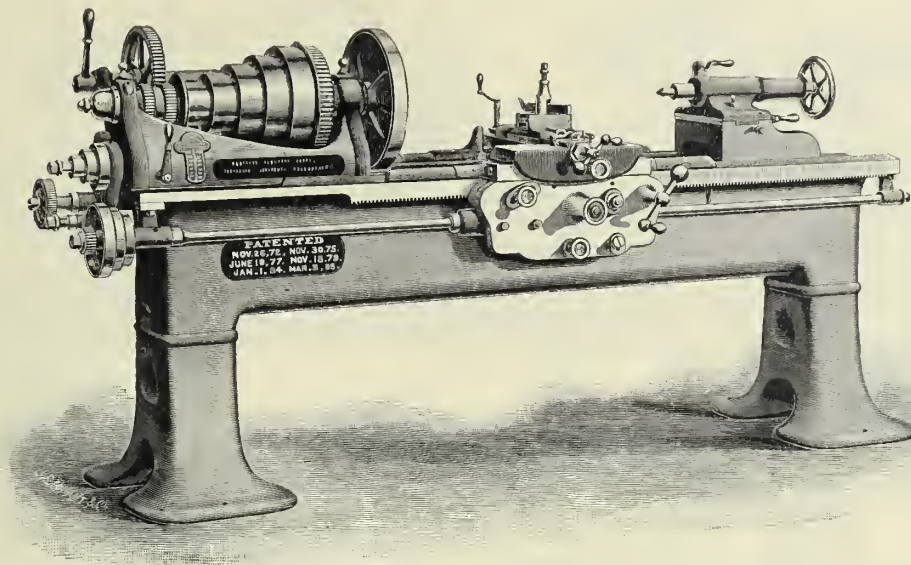
Furnished with 4 or 5 step cone (3 1/2 and 2 3/4 inch belt).
Elevating Rest furnished when ordered. Swing over carriage, 9 1/2 inches.
Range of screw cutting, 2 to 24 per inch.
Gears to cut even numbers up to 36 to inch, extra.

Taper attachment and shafting rest, extra
Pulleys on counter, 14 inches diameter, 4 1/2 inch face.
Countershaft should make 85 revolutions per minute.
Reversing speed, 95 revolutions per minute.

Patent combination (English and Metric), screw cutting, extra.

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FIG. 35.



PUTNAM STANDARD 18 INCH SWING ENGINE LATHE.

Note.—Cut does not illustrate latest type of Lathe—see Photo. These Lathes have new compound reversing gear stud for screw cutting.

ACTUAL SWING, 19 INCHES.

Solid or Hollow Spindle.					Hollow Spindle has 1 7-16 Inch Hole.				
Length of Bed.	Swing over Carriage.	Distance bet'n Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance bet'n Centers.	Screw Cutting.	Weight.
6 ft.	12½ in.	2 ft. ½ in.	Without.	3180	6 ft.	12½ in.	2 ft. ½ in.	With.	3300
7 "	"	3 " ½ "	"	3345	7 "	"	3 " ½ "	"	3465
8 "	"	4 " ½ "	"	3510	8 "	"	4 " ½ "	"	3630
9 "	"	5 " ½ "	"	3675	9 "	"	5 " ½ "	"	3795
10 "	"	6 " ½ "	"	3840	10 "	"	6 " ½ "	"	3960
11 "	"	7 " ½ "	"	4005	11 "	"	7 " ½ "	"	4125
12 "	"	8 " ½ "	"	4170	12 "	"	8 " ½ "	"	4295
13 "	"	9 " ½ "	"	4335	13 "	"	9 " ½ "	"	4455
14 "	"	10 " ½ "	"	4500	14 "	"	10 " ½ "	"	4620
15 "	"	11 " ½ "	"	4665	15 "	"	11 " ½ "	"	4785
16 "	"	12 " ½ "	"	4830	16 "	"	12 " ½ "	"	4950
17 "	"	13 " ½ "	"	4995	17 "	"	13 " ½ "	"	5115

Furnished with 4 or 5 step cone, 3½ in. x 2¾ in. belt.
Elevating rest furnished when ordered. Swing over carriage, 9½ inches.

Range of screw cutting, one thread in 6 in. to 24 per in.

Gears to cut even numbers up to 36 to in., extra.

Range of feed, ⅛ to 1 in. to one revolution of spindle.

Taper attachment, extra. Shafting rest, extra.

Pulleys on counter, 14 in. diameter, 4½ in. face.

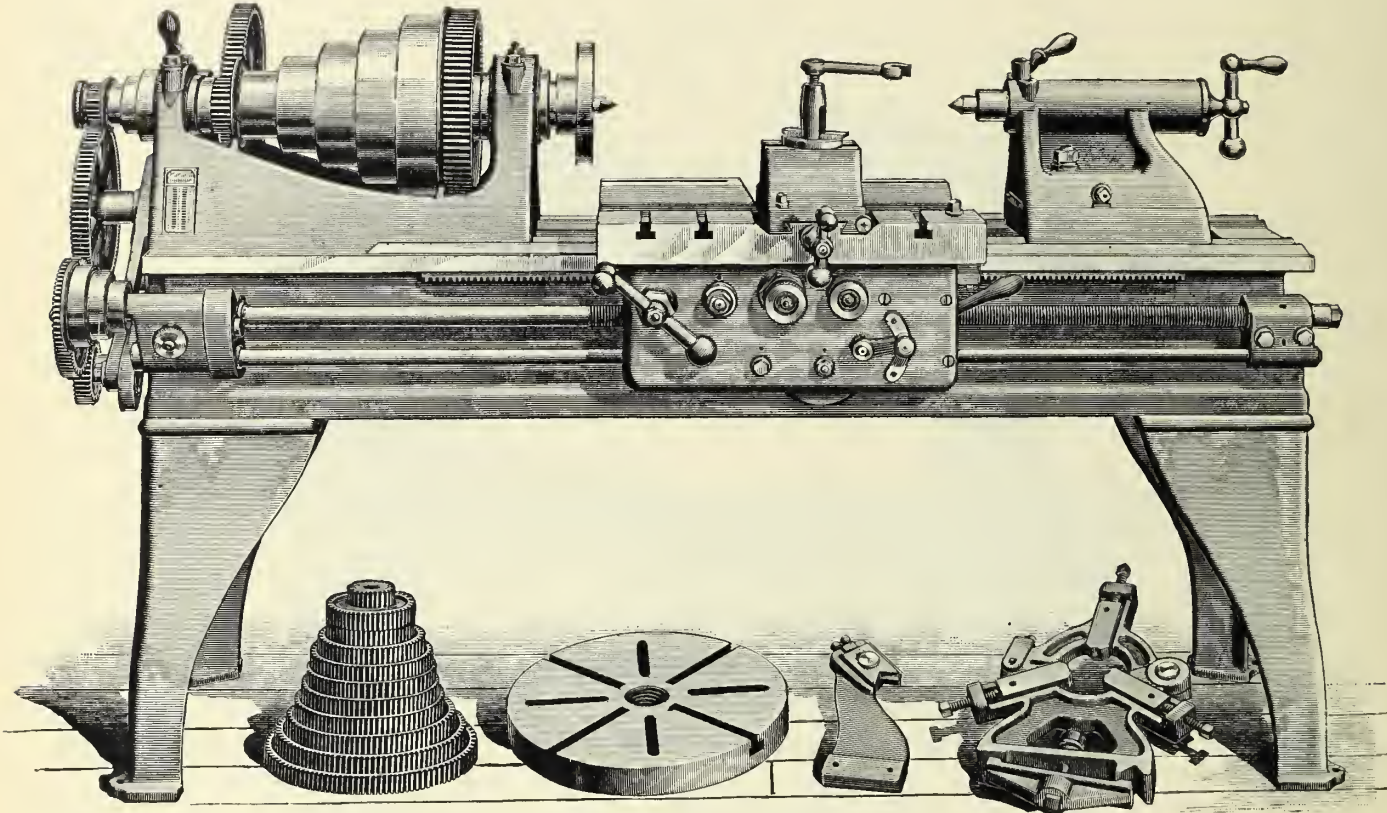
Countershaft should make 85 revolutions per minute.

Reversing speed, 95 revolutions per minute.

Patent combination (English and Metric), screw cutting, extra.

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FIG. 36.



IMPROVED 18 INCH SWING HOLLOW SPINDLE ENGINE LATHE.

THIS LATHE combines many recent improvements which adapt it to a wide range of work. The **headstock** is neat in appearance, and so massive as to entirely obviate any tendency to chatter or vibrate under heaviest cuts. The **spindle**, which is journaled in hard bronze boxes, is bored to receive $1\frac{1}{4}$ inch round bar in the rough, and is made from a forging of hard crucible steel in one piece with the collar, which forms a suitable surface for the face plates to screw against.

The value of this arrangement becomes apparent in connection with large hollow spindle, as it not only affords an ample shoulder for face plate, but also permits of making the nose of same large enough to carry the heaviest chuck work without the necessity of making the diameter of front journal of spindle excessively large, which in this case is $2\frac{3}{4}$ inches in diameter by $4\frac{1}{2}$ inches in length.

The **diameter of nose** is $2\frac{1}{2}$ inches by 2 inches long, threaded two-thirds of its length, four threads per inch, U. S. standard.

The **cone** has five steps for $2\frac{1}{2}$ inch belt, the largest speed being 12 inches in diameter, and the back gear ratio is 12 to 1, giving ten speeds, which increase in geometrical progression.

The **carriage** is 24 inches in length with full bearings on V's, and is gibbed to outside of bed.

Either a **plain** or **compound rest** is furnished at the option of purchaser.

The **compound rest** is so arranged that its handle may be revolved without interfering with cross-feed handle in any position.

The **base**, which is graduated in degrees, securely holds by means of one bolt the top when swiveled to any angle.

The **feeds** are driven directly from the spindle either with change-gearing or belt, and are reversed in the apron, where provision is made so that friction feed and lead-screw cannot be engaged at the same time to cause breakage.

Belt feeds are proportioned to give 80, 50, or 30 cuts to the inch, which will answer the usual requirements. With the gearing a range of feeds from 5 to 105 per inch is possible suitable for any purpose.

The **handle** shown in front of lead-screw box at head end of Lathe must simply be turned to the right or left to respectively engage the gear or belt feed, or *vice versa*, without the necessity of disengaging the change-gearing or removing the belts. Inasmuch as the motion is transmitted from the spindle to the lead-screw by the least possible number of gears, all of unusually large diameters, a much steadier motion is produced, of great value in cutting accurate screws.

The **tailstock** is clamped in its position by two bolts located as near the front as possible to prevent lifting.

A **2 inch spindle** is substantially fitted with 6 inches of movement, tightened in the usual manner when used in turning.

Screws, racks and small gears are made of steel. Flat surfaces are carefully scraped to bearing with surface plates, and cylindrical surfaces ground true.

A **new and improved taper attachment** is furnished if desired, with which tapers up to 4 inches to the foot may be accurately turned.

The **countershaft** is fitted with friction pulleys 12 inches in diameter by 4 inches face, of our latest pattern; which operate easily and almost positively, and should run 140 revolutions per minute.

Each Lathe is furnished with large and small face plates, steady rest, follow rest, and change gears necessary to cut nearly all threads from 1 to 20 per inch, inclusive of $11\frac{1}{2}$ for pipe thread, countershaft and wrenches complete. Any desired length of bed can be furnished.

SPECIFICATIONS.

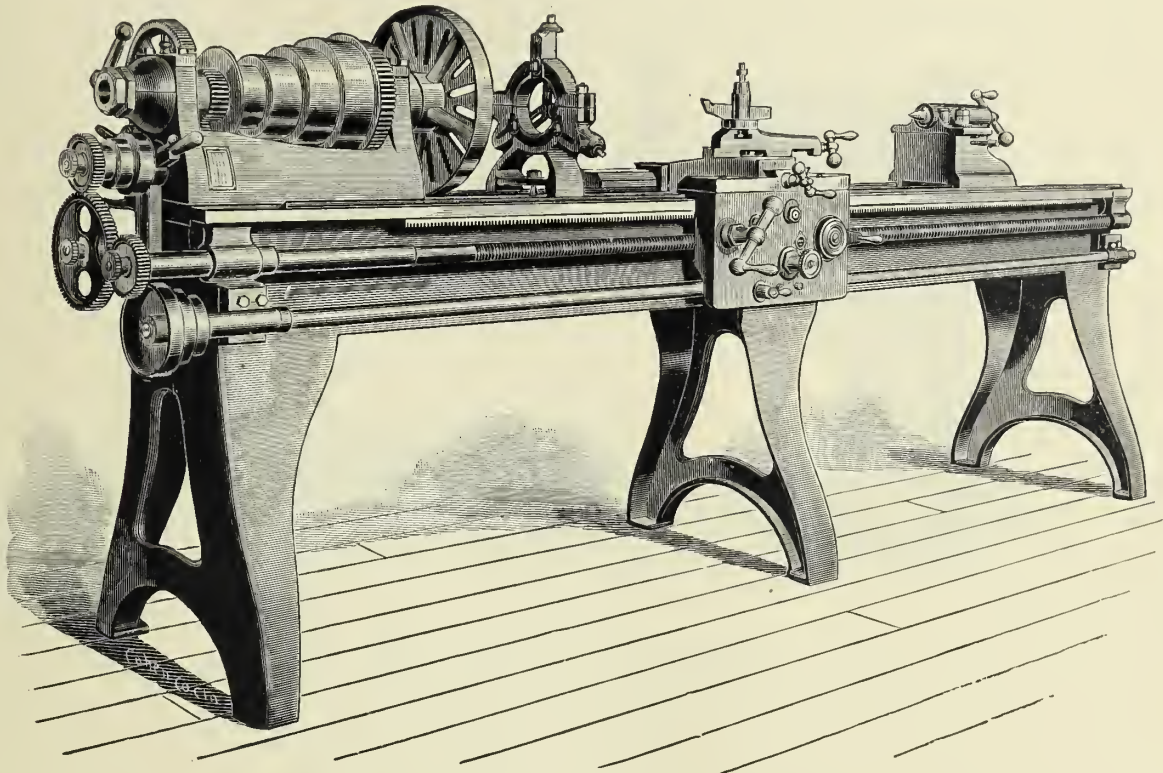
Diameter of front journal of spindle... $2\frac{3}{4}$ in.
Length of front journal of spindle... $4\frac{1}{2}$ in.
Diameter of hole through spindle...1 5-16 in.
Diameter of largest step of cone...12 in.

Width of belt..... $2\frac{1}{2}$ in.
Ratio of back-gearing.....12 to 1
Diameter of tailstock spindle.....2 in.
Swing over bed..... $18\frac{1}{4}$ in.

Swing over carriage.....12 in.
Length between centers with 6 foot bed.....2 ft. 8 in.
Weight.....2200 lbs.

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FIG. 37.



18 INCH SWING ENGINE LATHE, WITH HOLLOW SPINDLE ON 10 FOOT BED.

THIS LATHE has hollow spindle in the head with large boxes and long bearings.

The head is strongly back-gearred with a cross of 8 and 10 pitch, which prevents chatter.

It has steel feed-rod and leading-screw, with open and shut nut and steel worm.

Cuts threads 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 26, 28, 30.

Has 10-pitch steel rack, with steel pinion running in it; also steel rocker gears in the head.

Cone has 4 sections, $9\frac{1}{8}$, $7\frac{3}{8}$, $6\frac{1}{8}$, $4\frac{5}{8}$ inches, by $2\frac{1}{2}$ inches face.

Front bearing on spindle $5\frac{5}{8}$ inches long by $2\frac{7}{8}$ inches in diameter.

Back bearing, 3 inches long by $1\frac{1}{8}$ inches in diameter.

Centers conform to Morse Taper No. 3.

Swing over ways, 18 inches; swing over rest, 12 inches.

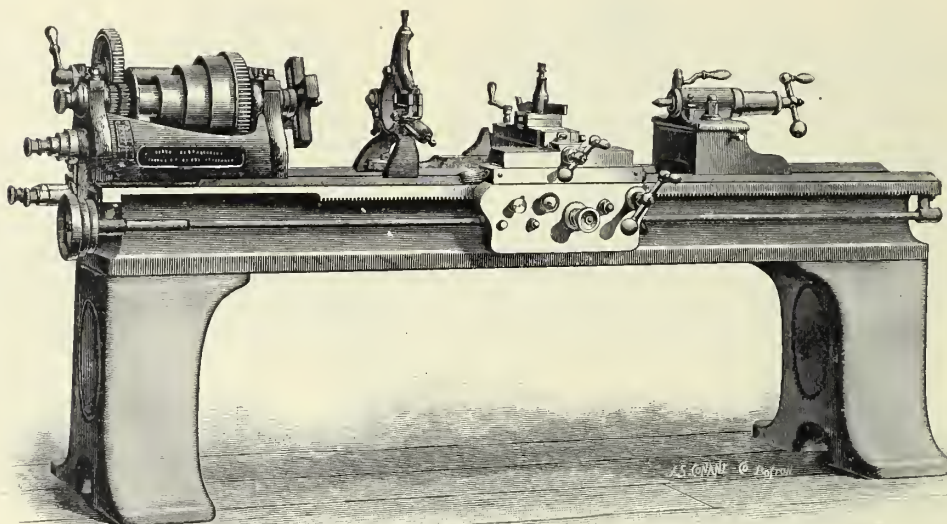
Distance between centers, 7 feet two inches.

Has friction countershaft, with pulleys 10 inches in diameter and $2\frac{3}{4}$ inches face.

We make this Lathe with either raise and fall-back gibbed rest, plain gibbed rest with power cross-feed, or compound rest with power cross-feed. The outfit of each Lathe is 1 large and 1 small face-plate, 1 center rest, 2 centers of tool-steel, a set of change gears to cut the above threads, countershaft and necessary wrenches.

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FIG. 38.



18 INCH SWING ENGINE LATHE.

SPECIFICATIONS.

Actual Swing, 19 Inches. Solid or Hollow Spindle. Hollow Spindle, 1 7-16 Inch Hole.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
6 feet.	12½ inches.	2 feet ½ inch.	Without.	3180	6 feet.	12½ inches.	2 feet ½ inch.	With.	3300
7 "	12½ "	3 " ½ "	"	3345	7 "	12½ "	3 " ½ "	"	3465
8 "	12½ "	4 " ½ "	"	3510	8 "	12½ "	4 " ½ "	"	3630
9 "	12½ "	5 " ½ "	"	3675	9 "	12½ "	5 " ½ "	"	3795
10 "	12½ "	6 " ½ "	"	3840	10 "	12½ "	6 " ½ "	"	3960
11 "	12½ "	7 " ½ "	"	4005	11 "	12½ "	7 " ½ "	"	4125
12 "	12½ "	8 " ½ "	"	4170	12 "	12½ "	8 " ½ "	"	4295
13 "	12½ "	9 " ½ "	"	4335	13 "	12½ "	9 " ½ "	"	4455
14 "	12½ "	10 " ½ "	"	4500	14 "	12½ "	10 " ½ "	"	4620
15 "	12½ "	11 " ½ "	"	4665	15 "	12½ "	11 " ½ "	"	4785
16 "	12½ "	12 " ½ "	"	4830	16 "	12½ "	12 " ½ "	"	4950
17 "	12½ "	13 " ½ "	"	4995	17 "	12½ "	13 " ½ "	"	5115

Furnished with 4 or 5 step cone (3½ and 2¾ inch belt).
Elevating Rest furnished when ordered. Swing over carriage, 9½ inches.

Range of screw cutting, 2 to 24 per inch.

Gears to cut even numbers up to 36 to inch, extra.

Taper attachment and shafting rest, extra
Pulleys on counter, 14 inches diameter, 4½ inch face.
Countershaft should make 85 revolutions per minute.
Reversing speed, 95 revolutions per minute.

Patent combination (English and Metric), screw cutting, extra.



20 INCH SWING ENGINE LATHE.

This Lathe is the same in general design as the 18 inch Lathe illustrated on opposite page.

SPECIFICATIONS.

Actual Swing, 21 inches. Solid or Hollow Spindle. Hollow Spindle has 1 5-8 Inch Hole.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
6 feet.	13½ inches.	1 foot 8 inches.	Without.	3780
7 "	13½ "	2 " 8 "	"	3965
8 "	13½ "	3 " 8 "	"	4150
9 "	13½ "	4 " 8 "	"	4365
10 "	13½ "	5 " 8 "	"	4520
11 "	13½ "	6 " 8 "	"	4705
12 "	13½ "	7 " 8 "	"	4890
13 "	13½ "	8 " 8 "	"	5075
14 "	13½ "	9 " 8 "	"	5260
15 "	13½ "	10 " 8 "	"	5445
16 "	13½ "	11 " 8 "	"	5630
17 "	13½ "	12 " 8 "	"	5815
18 "	13½ "	13 " 8 "	"	6000
19 "	13½ "	14 " 8 "	"	6185
20 "	13½ "	15 " 8 "	"	6370
21 "	13½ "	16 " 8 "	"	6555
22 "	13½ "	17 " 8 "	"	6740
23 "	13½ "	18 " 8 "	"	6925
24 "	13½ "	19 " 8 "	"	7110
25 "	13½ "	20 " 8 "	"	7295

With Taper Attachment.

Furnished with 4 or 5 step cone (4¼ or 3¼ inch belt),
Elevating rest furnished when ordered. Swing over carriage, 1⅜ inch.
Range of screw cutting, 1 to 16 per inch.
Taper attachment and shafting rest, extra.
Patent combination (English and Metric) screw cutting extra.

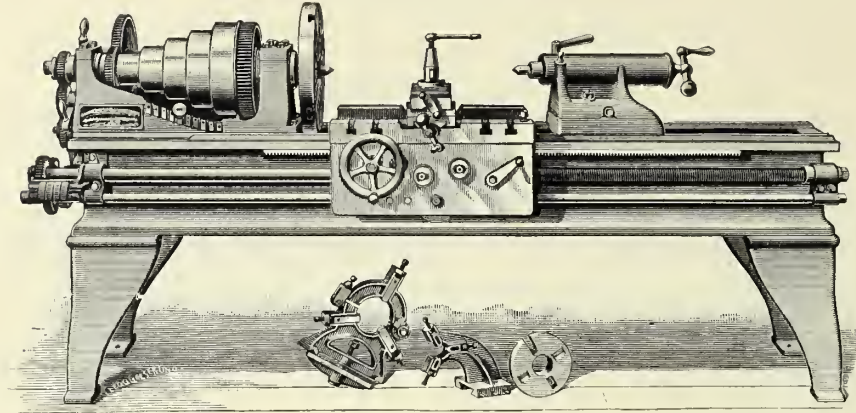
Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
6 feet.	13½ inches.	1 foot 8 inches.	With.	3930
7 "	13½ "	2 " 8 "	"	4115
8 "	13½ "	3 " 8 "	"	4300
9 "	13½ "	4 " 8 "	"	4485
10 "	13½ "	5 " 8 "	"	4670
11 "	13½ "	6 " 8 "	"	4855
12 "	13½ "	7 " 8 "	"	5040
13 "	13½ "	8 " 8 "	"	5225
14 "	13½ "	9 " 8 "	"	5410
15 "	13½ "	10 " 8 "	"	5595
16 "	13½ "	11 " 8 "	"	5780
17 "	13½ "	12 " 8 "	"	5965
18 "	13½ "	13 " 8 "	"	6150
19 "	13½ "	14 " 8 "	"	6335
20 "	13½ "	15 " 8 "	"	6520
21 "	13½ "	16 " 8 "	"	6705
22 "	13½ "	17 " 8 "	"	6890
23 "	13½ "	18 " 8 "	"	7075
24 "	13½ "	19 " 8 "	"	7260
25 "	13½ "	20 " 8 "	"	7445

With Taper Attachment.

No. 1 and No. 2 portable straightening machine, extra.
Pulleys on counter, 16 inches diameter, 5 inch face.
Countershaft should make 80 revolutions per minute. Reversing speed, 90 revolutions per minute.
Patent combination (English and Metric) screw cutting extra.

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FIG. 39.



18 AND 22 INCH PATTERN IMPROVED ENGINE LATHE.

ON 6 FOOT BED.

THESE LATHES combine many improved features which particularly recommend them to machine users who desire a first-class, reliable tool.

The Head.—The head is neat and massive. The cone pulley has five steps for a $2\frac{1}{2}$ inch belt, with diameters of 12, 10, 8, 6 and 4 inches, and makes twelve revolutions while the spindle makes one—when the back gear is engaged. The spindle is of crucible steel with a $1\frac{5}{16}$ inch hole through it, and is mounted in bearings of the best quality of bronze. The front bearing is 3 inches diameter by $4\frac{1}{2}$ inches long; the back bearing is $2\frac{3}{16}$ inches diameter by $3\frac{1}{2}$ inches long; the spindle is ground in order to insure its being absolutely round and straight. The thrust collars are of steel, hardened and ground. All the change gears are of steel and are mounted on a shaft which runs in substantial bearings in the bed, directly under the head. The change gears receive their motion from the gear shown on the outer end of spindle.

The Tail Stock.—The tail stock is made in the most approved form for strength and neatness, and is shaped so that the compound rest may be set at an angle without coming in contact with it. Suitable screws are provided for setting over sideways, and an index, marked to sixteenths, is cut on the base with a zero line in the center of the two inches. This shows very plainly from the top and is an improvement over having it at the sides. The tail spindle is 2 inches diameter and has a movement of 7 inches. The nut is $2\frac{1}{2}$ inches long, cut in the solid spindle, and will wear a lifetime.

The Carriage.—The carriage has had every care taken to make it fully meet the demands made upon this important part. It is extremely heavy and substantial; is provided with liberal T slots, and is gibbed to the bed its entire length. The bearing on the bed is not recessed, but has a full bearing from end to end and the entire depth of V on the bed. It is also provided with a screw and clamp for locking it while using the cross-feed. Provision is also made to carry off either cuttings or water that may find their way on to the cross-feed screw.

Cross-Feed Screws and Compound Rest.—The compound rest is in keeping with the balance of the lathe for substantiability. Both the upper and lower slides are fitted with taper gibs, which, besides being tapering, are tongued and grooved into the sides, so that no amount of strain will disturb them. The taper gibs are provided with only two screws: one front and one back, which take up the wear the entire length, and which will not require resetting perhaps more than once a year. The top slide is of ample width, so that heavy cutting may be done without projecting the tool out away from the rest. The top slide has a movement of 5 inches in length for angles, and is fitted with a screw of ten pitch; this screw is provided with an indexed micrometer divided into lines, each of which reads 2-100ths. This is for the purpose of reducing stock as required, and reading the diameter without the use of calipers—excepting as tests. The lower slide is provided with a micrometer divided into 64ths of an inch; thus, every line the screw is turned in a given direction would indicate a change in diameter of the stock of $1\text{-}64\text{th}$ of an inch. A turn of sixty-four lines will, of course, reduce the stock one inch. When starting the cut an exact diameter may be obtained without the use of calipers, by using the tail spindle as a gauge. For example: secure the tool firmly in place, move it forward until its point touches the spindle; the tool is then set to turn a diameter of two inches. If smaller diameters are wanted, move forward by the micrometer the required amount as explained. If larger diameters are wanted, move backward in the same manner, except that in moving backward, a half-turn more than required should be made and then brought back to the proper place, in order that lost motion may not cause confusion.



IMPROVED 18 INCH SWING ENGINE LATHE.

General Description Continued.

The Apron.—The apron, one of the most important parts, has received especial care. It is fastened to the carriage by four square head cap screws; is of ample length, width and thickness, and is provided with three heavy braces its entire depth. The studs are steel and are hardened and ground. All pinions for crank, friction, cross-feed and rack are steel. The reverse for the feeds is extremely simple. It is composed of two spur gears mounted on a plate, and is always at the hand of the operator. The half-nuts are planed to fit directly into substantial bearings in the apron and are entirely independent of any cap screws. They are operated by a cam having its grooves carefully milled. The studs revolve partially in half-nuts, and the square heads of the studs are a neat fit in the milled grooves of the cam—the whole forming a substantial combination that will out-wear the other parts of the machine and never cause trouble. We have provided a small drop-cam that prevents the half-nuts becoming engaged with the lead screw while the Lathe is feeding.

Indexed Crank Shaft for Internal Work.—Suppose a hole should be counterbored to a given depth and diameter. The depth may be read by the index on the crank shaft instead of measuring off by a rule, and a diameter for counterbore may be made by reading the cross-feed screw index. In chasing internally this not only prevents the breaking of tools, but makes an exact diameter. All parts are easily accessible to oil.

The Bed.—The bed is designed with ample depth and proper width and bracing. The surfaces, to which the lead screw bearings are fastened, are planed to receive them, and are tongued and grooved and are in perfect alignment. The tops of the V's are rounded to avoid bruising. The racks are of steel in one piece, accurately cut, and in order to best receive the strain brought to bear on them, they are fitted endwise into a recess cast into the bed.

Screw Cutting.—The screw cutting feature of these lathes is covered with several patents and has many points of excellence. The change gears are all of steel and are mounted on a short 1 3-16 inch shaft running in substantial bearings in the bed, and directly under the head stock. The knob shown in front of the head carries a gear that continually runs, either right or left; this gear may be dropped into any one of the ten steel change gears instantly, and thus gives any one of forty changes of speed, because, on the outer end of the change-gear shaft are four gears, into any one of which the gear shown on the lead screw may engage; not a single gear is ever removed to obtain the different threads or feeds. A substantial and simple plate is used to change from right to left-hand screws. The index plate has the words "threads" "knob" on the upper line; under the word "threads" are the numbers of threads the lathe will cut—for the eighteen inch lathe, from two to thirty-two. Under the word "knob" are the figures one to ten; thus, should the operator desire to cut any certain thread; he finds this on the index plate, engages his gear opposite to it, places the knob in the hole indicated on the plate and starts his tool to work.

Feeds.—Any feed from six to eighty may be obtained for either length or cross-feed; the feeding is done entirely independent of the lead screw. The index reads from 6 to 12, 12 to 20, 20 to 40, 40 to 80. Should any of our customers desire it, we can furnish them with a printed card giving all of the fractional threads and feeds that can be obtained in the entire combination. This list also gives the scrolls that can be cut by the cross slide.

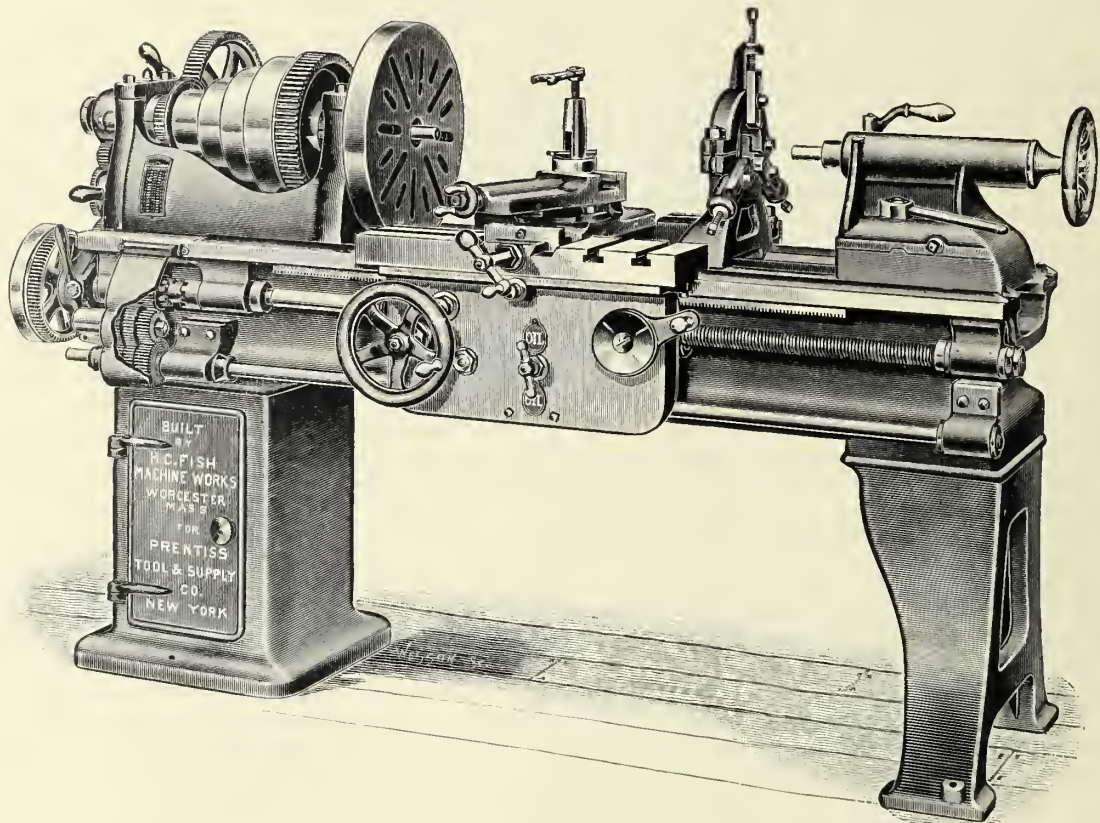
Countershaft.—The countershaft is provided with a cone pulley of larger diameters than the one on the spindle, in order to give ample belt power. This cone pulley is flanged at both ends. The countershaft is fitted with friction pulleys 12 x 3½ inches, which pulleys have chambered cores with wool to retain oil. The hanger boxes are also arranged to hold a supply of oil. We furnish with these a hook and eye to attach to the top of the shifter and ceiling, and also a dog to attach the shift-rod to the vertical stick. Plain or compound rest is furnished as desired. Every lathe is fitted with follow and steady rests, plain or friction countershaft, large and small face plates, wrenches, etc. These lathes are manufactured in 18, 20, 22, 24, 27 and 30 inch swing.

SPECIFICATIONS.

Size of Lathe,	-	-	-	-	-	18 INCH SWING, 6 Foot Bed.	22 INCH SWING, 8 Foot Bed.
Ratio of back gearing,	-	-	-	-	-	12 to 1	13 to 1
Cone diameter,	-	-	-	-	-	{ 12 ins., 10 ins., 8 ins., 6 ins., 4 ins.	{ 14½ ins., 12½ ins., 9¾ ins., 7¾ ins., 5 ins. }
Width of belt on cone,	-	-	-	-	-	2½ ins.	3 ins.
Hole through spindle,	-	-	-	-	-	1 5-16 in.	1 13-16 in.
Front bearing of spindle,	-	-	-	-	-	3 ins. dia., 4½ ins. long	3 7-16 ins. diam., 5¼ ins. long
Diameter of tail spindle,	-	-	-	-	-	2 ins.	2 7-16 ins.
Lathe will cut screws from	-	-	-	-	-	2 to 32	2 to 28
Feeds per inch,	-	-	-	-	-	4 to 80	4 to 80
Weight,	-	-	-	-	-	2,200 pounds	3,500 pounds
Speed of countershaft,	-	-	-	-	-	150 rev.	150 rev.
Size of pulleys on countershaft,	-	-	-	-	-	12 ins. x 4 ins.	14 ins. x 4½ ins.
Lathe will take between centers,	-	-	-	-	-	3 ft. 2 ins.	4 ft.
Beds made in lengths of	-	-	-	-	-	6-8-10-12-14-16 ft.	8-10-12-14-16-18 ft.
Swing over carriage,	-	-	-	-	-	11 ins.	14½ ins.

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FIG. 40.



PRENTISS STANDARD 20 INCH SWING ENGINE LATHE.

THESE LATHES are made from new patterns throughout; are attractive and symmetrical in outline, and weigh about one-third more than ordinary Lathes.

Special attention has been given to combine strength and rigidity with ease of operation.

The journals are large and carefully finished. An improved device to furnish geared feed to the rod so that lead screw will remain idle is a particular feature of this Lathe.

Spindles are made of hammered high carbon steel.

Boxes are of the best phosphor bronze, and are so designed that new ones can be substituted at any time and easily set in perfect alignment.

The lead screw and rod and all actuating screws are made of special grade of steel.

The carriage has an extra long bearings on ways; and the compound rest also has a long bearing on carriage.

All standard lathes have a slide at back of bed for taper attachment, which can be used at any part of the bed; it is simple, substantial and capable of boring or turning a taper six inches to one foot.

These lathes are provided with variable feed of great range, which is adapted to all kinds of work.

An endless belt is used on feed cones and can be easily tightened without cutting and lacing same.

Automatic cross feed, compound center, traverse and full swing rests, and countershaft with friction pulleys are furnished with all sizes.

Hollow spindles are furnished when required.

This Lathe in future will be furnished with a cabinet on each end of bed.

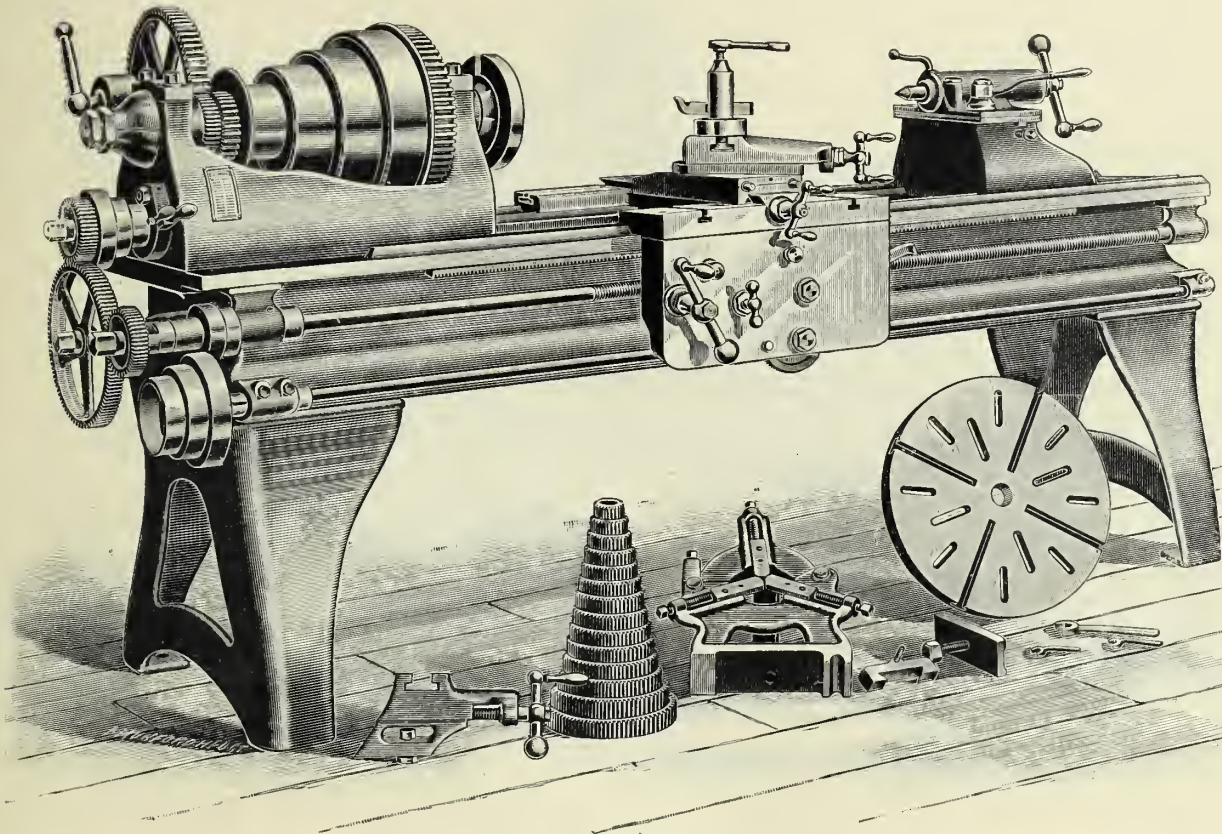
Lathes are made with beds of any even length, varying by two feet.

SPECIFICATIONS.

Size of Lathe, - - - - -	20 inches	Face of steps on cone, - - - - -	3 1/8 inches
Swing of Lathe, - - - - -	20 1/2 inches	Diameter of largest step, - - - - -	12 inches
Swing over carriage, - - - - -	13 1/8 inches	Cuts threads, - - - - -	2 to 20
Length of bed, - - - - -	8 feet	Diameter of pulleys on countershaft, - - - - -	12 inches
Turns between centers, - - - - -	4 feet 4 inches	Width of belt, - - - - -	4 inches
Number of steps on cone, - - - - -	4	Revolutions of countershaft, - - - - -	125

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FIG. 41.



20 INCH SWING ENGINE LATHE, WITH HOLLOW SPINDLE.

THIS LATHE has hollow spindle with large bearings.

Head is strongly back geared with a cross of 5 and six pitch, which prevents chatter.

Cone pulley has four sections, $12\frac{3}{4}$, $10\frac{7}{8}$, $7\frac{1}{2}$, $4\frac{7}{8}$ inches in diameter, respectively, for 3 inch belt.

Compound rest is securely gibbed to the outside of bed at front and back sides with long bearing on the bed.

Side Tool Block is furnished with each Lathe for turning work as large as Lathe will swing.

The power cross-feed is run by bevel gears, making it entirely independent from other working parts of the apron.

Steel feed-rod and leading screw with open and shut nut.

Cuts threads 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, per inch.

Steel rack and pinion for moving carriage.

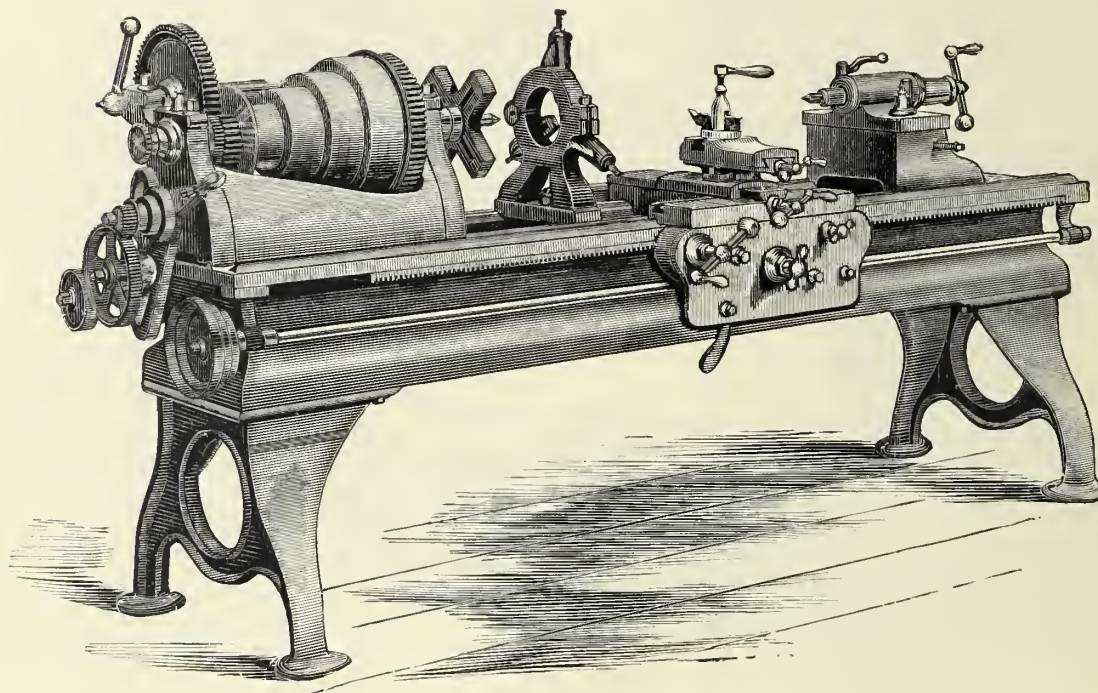
Rack gears can be drawn out of the rack, preventing wear on these parts when not required in screw-cutting and other similar work. This does away with the annoyance of revolving handles.

Has friction counter-shaft with pulleys 14 inches in diameter for 4-inch belt. Should make 100 revolutions per minute.

Weight 3100 lbs.

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FIG. 42.



20 INCH SWING ENGINE LATHE, ON 10 FOOT BED.

THE above illustration represents a 20 inch swing engine Lathe on 10 foot bed, with compound rest. These Lathes are back geared and screw cutting, have rod feed, with power cross feed, and are furnished with compound rest, center rest, large and small face plate, full set of screw gears, counter shaft with friction pulleys, wrenches, etc., etc. The spindles are *forged* steel and run in bronze metal boxes, the lead screw, feed rod, feed rack and pinion gear for same, as well as all working screws, are *steel*, the rack and pinion being cut from the solid.

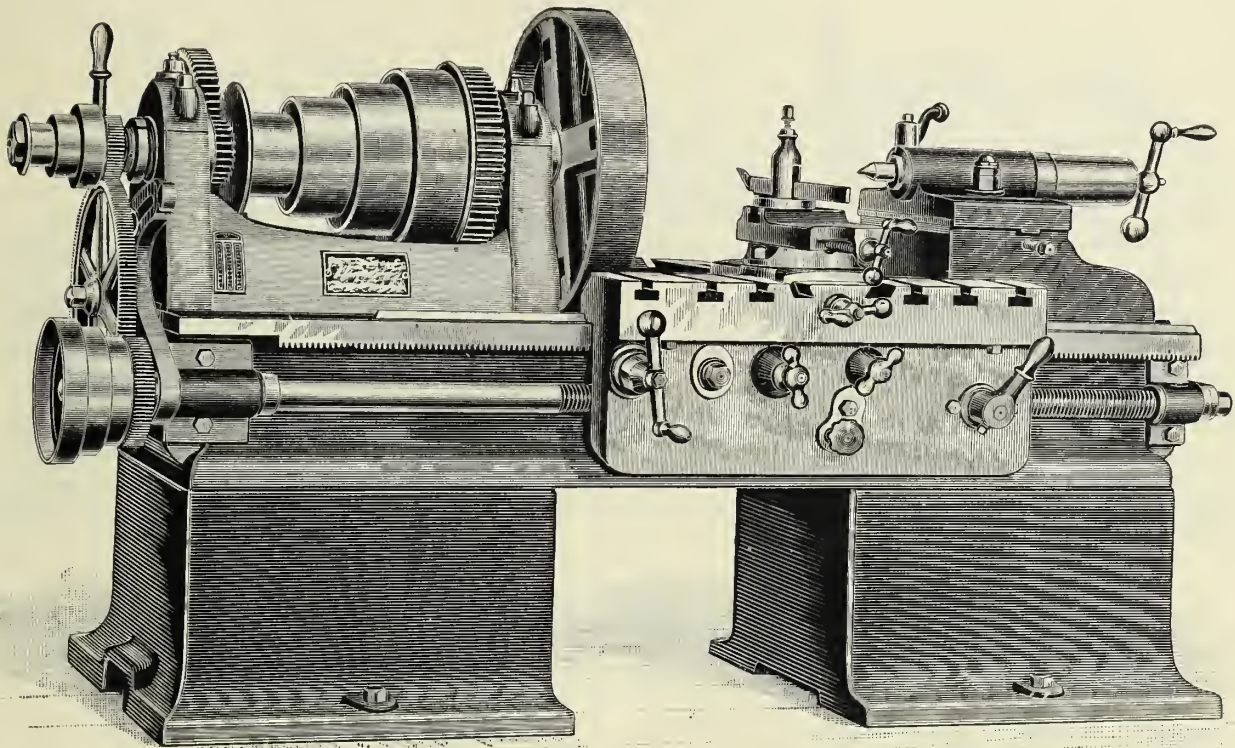
SPECIFICATIONS.

This Lathe will take 6 feet between centers, and swing about $12\frac{1}{2}$ inches over the carriage, the front bearing to the spindle is $2\frac{1}{2} \times 4\frac{1}{2}$ inches, the cones carry a $2\frac{3}{4}$ inch belt, the friction pulleys on countershaft are $14 \times 3\frac{3}{4}$ inches and should make about 125 revolutions per minute, the carriage has a bearing of 26 inches in length on the ways. They will be built with beds as desired up to and including 20 feet in length.

Weight complete on 10 foot bed about 2300 pounds.

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FIG. 43.



22 AND 23 INCH PATTERN ENGINE LATHES.

THESE LATHES are of a new design and are built from entirely new patterns. The bearings are large and long; the cones have broad faces; the head is very strongly back geared; the gearing cut coarse and is still running; has friction feed, inside power cross feed compound rest to move in any horizontal direction; very strong gibbed carriage, screw cutting; is fitted with open and shut nut, consequently screw and carriage can be connected at any point.

The feed is unusually strong and durable, and can be changed from right to left, or *vice versa*, in an instant.

The spindle is forged cast steel, the rack and pinion gear for same are of steel (cut from the solid), as well as other parts that require great strength and are exposed to wear; the important sliding parts are scraped together, not ground with emery.

Each Lathe is furnished with large and small face plate, compound rest, center rest, full set of screw cutting gears, countershaft with patent friction pulleys, wrenches, etc.

Beds furnished of any desired length.

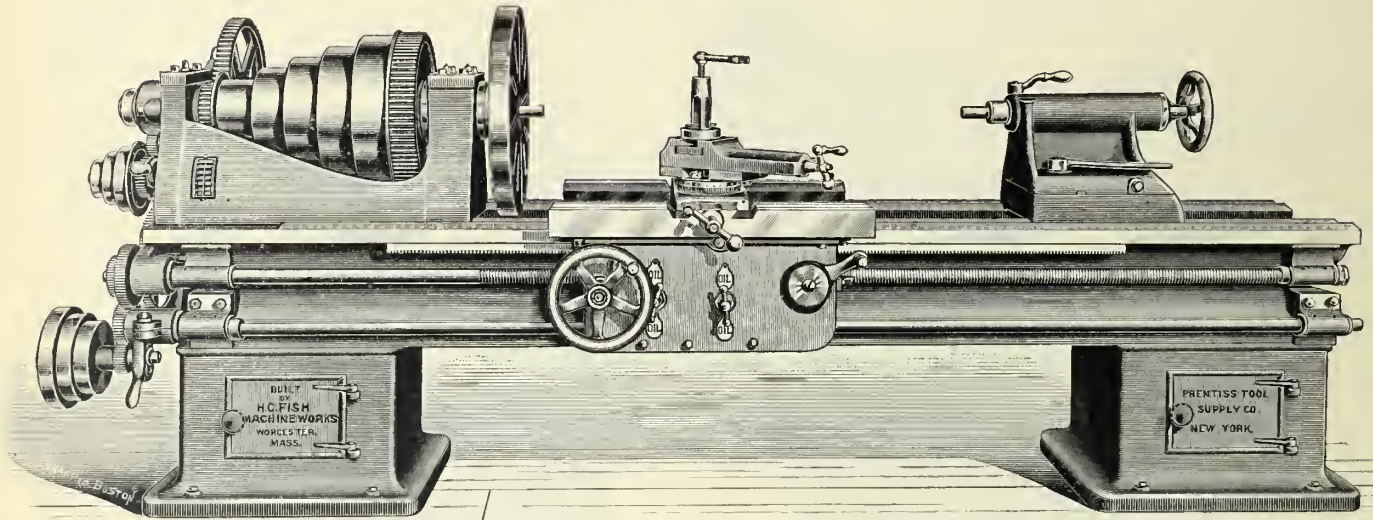
SPECIFICATIONS.

22 INCH SWING.	
Swing over ways, - - - - -	22 inches
Length of bed, - - - - -	8 feet
Turns, - - - - -	3 feet 6 inches
Diameter of front bearing, - - - - -	3½ inches
Diameter of back bearing, - - - - -	2½ inches
Diameter of spindle through cone, - - - - -	2¼ inches
Width of cone belt, - - - - -	3½ inches
Distance between head and tail-stock V's, - - - - -	12½ inches
Carriage has solid bearing, on ways - - - - -	30 inches
Weight, about - - - - -	3200 pounds

23 INCH SWING.	
Swing over ways, - - - - -	23 inches
Length of bed, - - - - -	7 feet
Turns, - - - - -	3 feet
Diameter front bearing, - - - - -	3½ inches
Diameter of back bearing, - - - - -	3¼ inches
Diameter of spindle through cone, - - - - -	3½ inches
Hollow spindle, - - - - -	2¼ inches
Width of cone belt - - - - -	3 inches
Distance between head and tail-stock V's, - - - - -	12 inches
Carriage has solid bearings on ways, - - - - -	30 inches
Weight, about - - - - -	3300 pounds

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FIG. 44.



24 INCH SWING STANDARD ENGINE LATHE.

THESE LATHES are made from new patterns throughout ; are attractive and symmetrical in outline, and weigh about one-third more than ordinary Lathes.

Special attention has been given to combine strength and rigidity with ease of operation.

The journals are large and carefully finished.

Spindles are made of hammered high carbon steel.

Boxes are of the best phosphor bronze, and are so designed that new ones can be substituted at any time and easily set in perfect alignment.

The lead screw and rod and all actuating screws are made of a special grade of steel.

The carriage has an extra long bearing on ways ; and the compound rest also has a long bearing on carriage.

All standard lathes have a slide at back of bed for taper attachment, which can be used at any part of the bed ; it is simple, substantial and capable of boring or turning a taper six inches to one foot.

These Lathes are provided with variable feed of great range, which is adapted to all kinds of work.

An endless belt is used on feed cones and can be easily tightened without cutting and lacing same.

Automatic cross feed, compound, center, traverse and full swing rests, and countershaft with friction pulleys are furnished with all sizes.

Hollow spindles are furnished when required.

Lathes are made with beds of any even length, varying by two feet.

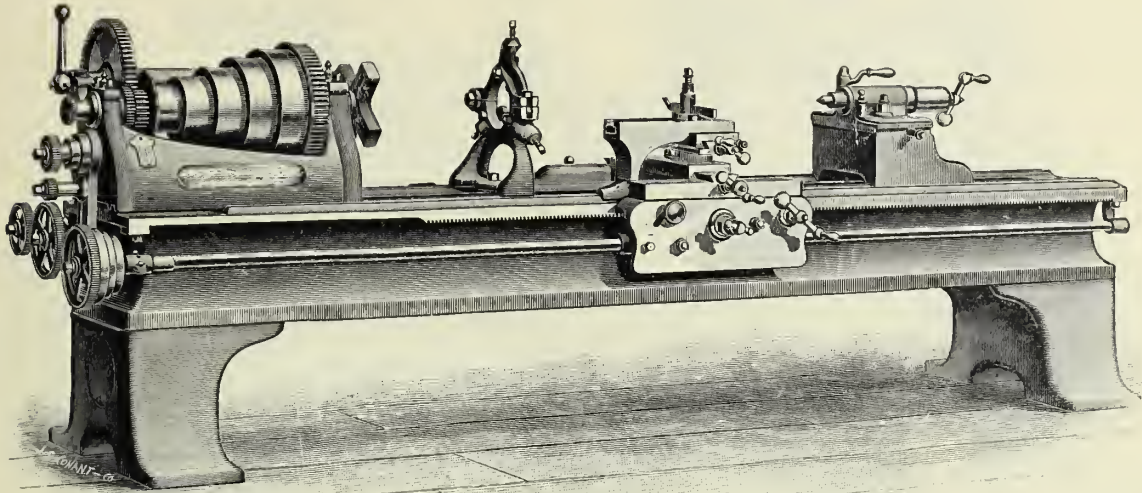
SPECIFICATIONS.

Size of Lathe,	- - - - -	24 inches
Swing of Lathe,	- - - - -	24½ inches
Swing over carriage,	- - - - -	17 inches
Length of bed,	- - - - -	8 feet
Turns between centers,	- - - - -	3 feet 2 inches
Number of steps on cone,	- - - - -	5

Face of steps on cone,	- - - - -	3¾ inches
Diameter of largest step,	- - - - -	15½ inches
Cuts threads,	- - - - -	2 to 20
Diameter of pulleys on countershaft,	- - - - -	14 inches
Width of belt,	- - - - -	4 inches
Revolutions of countershaft,	- - - - -	120

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FIG. 45.



24 INCH SWING ENGINE LATHE.

Note.—Cut does not show recent changes. For latest illustration, see Photo.

ACTUAL SWING, 25 INCHES.

SPECIFICATIONS.

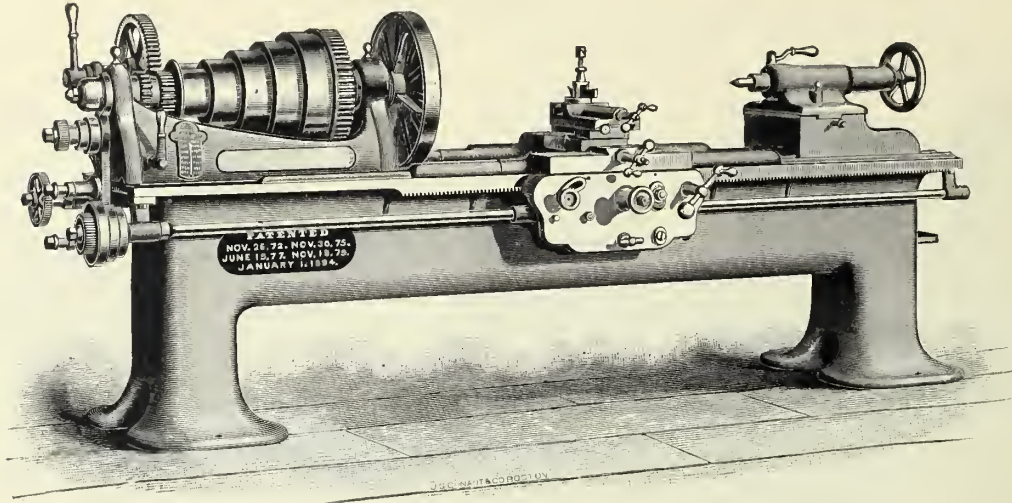
Length of Bed.	Swing over Carriage.	Between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Between Centers.	Screw Cutting.	Weight.
8 feet.	17 inches.	3 feet.	Without.	5000	8 feet.	17 inches.	3 feet.	With.	5250
9 "	17 "	4 "	"	5210	9 "	17 "	4 "	"	5460
10 "	17 "	5 "	"	5420	10 "	17 "	5 "	"	5670
11 "	17 "	6 "	"	5630	11 "	17 "	6 "	"	5880
12 "	17 "	7 "	"	5840	12 "	17 "	7 "	"	6090
13 "	17 "	8 "	"	6050	13 "	17 "	8 "	"	6300
14 "	17 "	9 "	"	6260	14 "	17 "	9 "	"	6510
15 "	17 "	10 "	"	6470	15 "	17 "	10 "	"	6720
16 "	17 "	11 "	"	6680	16 "	17 "	11 "	"	6930
17 "	17 "	12 "	"	6890	17 "	17 "	12 "	"	7140
18 "	17 "	13 "	"	7100	18 "	17 "	13 "	"	7350
19 "	17 "	14 "	"	7310	19 "	17 "	14 "	"	7560
20 "	17 "	15 "	"	7520	20 "	17 "	15 "	"	7770
21 "	17 "	16 "	"	7730	21 "	17 "	16 "	"	7980
22 "	17 "	17 "	"	7940	22 "	17 "	17 "	"	8190
23 "	17 "	18 "	"	8150	23 "	17 "	18 "	"	8400
24 "	17 "	19 "	"	8360	24 "	17 "	19 "	"	8610
25 "	17 "	20 "	"	8570	25 "	17 "	20 "	"	8820
26 "	17 "	21 "	"	8780	26 "	17 "	21 "	"	9030
27 "	17 "	22 "	"	8990	27 "	17 "	22 "	"	9240
28 "	17 "	23 "	"	9200	28 "	17 "	23 "	"	9450
29 "	17 "	24 "	"	9410	29 "	17 "	24 "	"	9660
30 "	17 "	25 "	"	9620	30 "	17 "	25 "	"	9870
31 "	17 "	26 "	"	9830	31 "	17 "	26 "	"	10080
32 "	17 "	27 "	"	10040	32 "	17 "	27 "	"	10290
33 "	17 "	28 "	"	10250	33 "	17 "	28 "	"	10500
34 "	17 "	29 "	"	10460	34 "	17 "	29 "	"	10710

Driving speed of counter, 75 revolutions per minute.
Reversing speed of counter, 85 revolutions per minute.
Tap attachment and shafting rest, extra.
Hollow spindle, with 1 15-16 inch hole, extra.

Range of screw cutting, 1 to 16 per inch.
Countershaft pulleys (friction), 16 inches diameter, 5½ inches face.
Traverse rest and No. 2 portable straightening machine, extra.

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FIG. 45A.



PUTNAM STANDARD 24 INCH SWING ENGINE LATHE.

ACTUAL SWING, 25 INCHES.

Note.—Cut does not illustrate latest type of Lathe, see Photo. These Lathes have new compound reversing gear-stud for screw cutting. For general description of this Lathe see page 22.

SPECIFICATIONS.

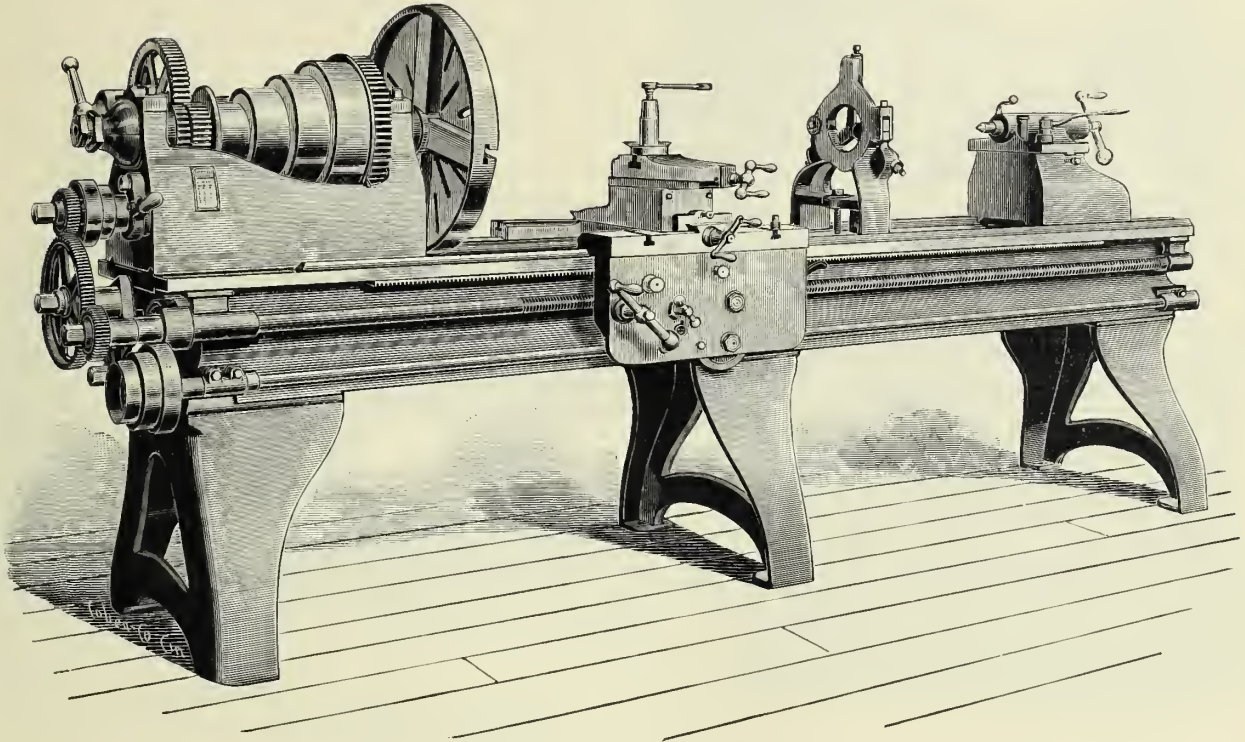
Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
8 feet.	17 inches.	3 feet.	Without.	5000	8 feet.	17 inches.	3 feet.	With.	5250
9 "	17 "	4 "	"	5210	9 "	17 "	4 "	"	5960
10 "	17 "	5 "	"	5420	10 "	17 "	5 "	"	5670
11 "	17 "	6 "	"	5630	11 "	17 "	6 "	"	5880
12 "	17 "	7 "	"	5840	12 "	17 "	7 "	"	6090
13 "	17 "	8 "	"	6050	13 "	17 "	8 "	"	6300
14 "	17 "	9 "	"	6260	14 "	17 "	9 "	"	6510
15 "	17 "	10 "	"	6470	15 "	17 "	10 "	"	6720
16 "	17 "	11 "	"	6680	16 "	17 "	11 "	"	6930
17 "	17 "	12 "	"	6890	17 "	17 "	12 "	"	7140
18 "	17 "	13 "	"	7100	18 "	17 "	13 "	"	7350
19 "	17 "	14 "	"	7310	19 "	17 "	14 "	"	7560
20 "	17 "	15 "	"	7520	20 "	17 "	15 "	"	7770
21 "	17 "	16 "	"	7730	21 "	17 "	16 "	"	7980
22 "	17 "	17 "	"	7990	22 "	17 "	17 "	"	8190
23 "	17 "	18 "	"	8150	23 "	17 "	18 "	"	8400
24 "	17 "	19 "	"	8360	24 "	17 "	19 "	"	8610
25 "	17 "	20 "	"	8570	25 "	17 "	20 "	"	8820
26 "	17 "	21 "	"	8780	26 "	17 "	21 "	"	9030
27 "	17 "	22 "	"	8990	27 "	17 "	22 "	"	9290
28 "	17 "	23 "	"	9200	28 "	17 "	23 "	"	9450
29 "	17 "	24 "	"	9410	29 "	17 "	24 "	"	9660
30 "	17 "	25 "	"	9620	30 "	17 "	25 "	"	9870
31 "	17 "	26 "	"	9830	31 "	17 "	26 "	"	10080
32 "	17 "	27 "	"	10040	32 "	17 "	27 "	"	10290
33 "	17 "	28 "	"	10250	33 "	17 "	28 "	"	10500
34 "	17 "	29 "	"	11460	34 "	17 "	29 "	"	10710

Driving speed of counter, 75 revolutions per minute.
 Reversing speed of counter, 85 revolutions per minute.
 Taper attachment and shafting rest, extra.
 Hollow spindle with $1\frac{1}{8}$ inch hole, extra.

Range of screw cutting, one thread in 12 in. to 16 per in.
 Range of feed, $\frac{1}{16}$ to $1\frac{1}{8}$ in. to one revolution of spindle.
 Countershaft pulleys (friction), 16 in. diameter, $5\frac{1}{2}$ in. face.
 Traverse rest and No. 2 portable straightening machine, extra.

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FIG. 46.



26 INCH SWING ENGINE LATHE, WITH HOLLOW SPINDLES, ON 12 FOOT BED.

THIS LATHE has hollow spindle with large bearings.

The head is strongly back-geared with a cross of 5 and 6 pitch which prevents chatter.

Cone pulley has 4 sections, $12\frac{3}{4}$, $10\frac{1}{8}$, $7\frac{1}{2}$, $4\frac{7}{8}$ inches diameter respectively for 3 inch belt.

Compound rest is securely gibbed to the outside of bed at front and back sides with long bearing on the bed.

Side Tool Block is furnished with each Lathe for turning work as large as Lathe will swing.

The power cross-feed is run by bevel gears, making it entirely independent from other working parts of the apron.

Steel feed-rod and leading-screw, with open and shut nut.

Cut threads 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18 per inch.

It has steel rack and pinion for moving carriage.

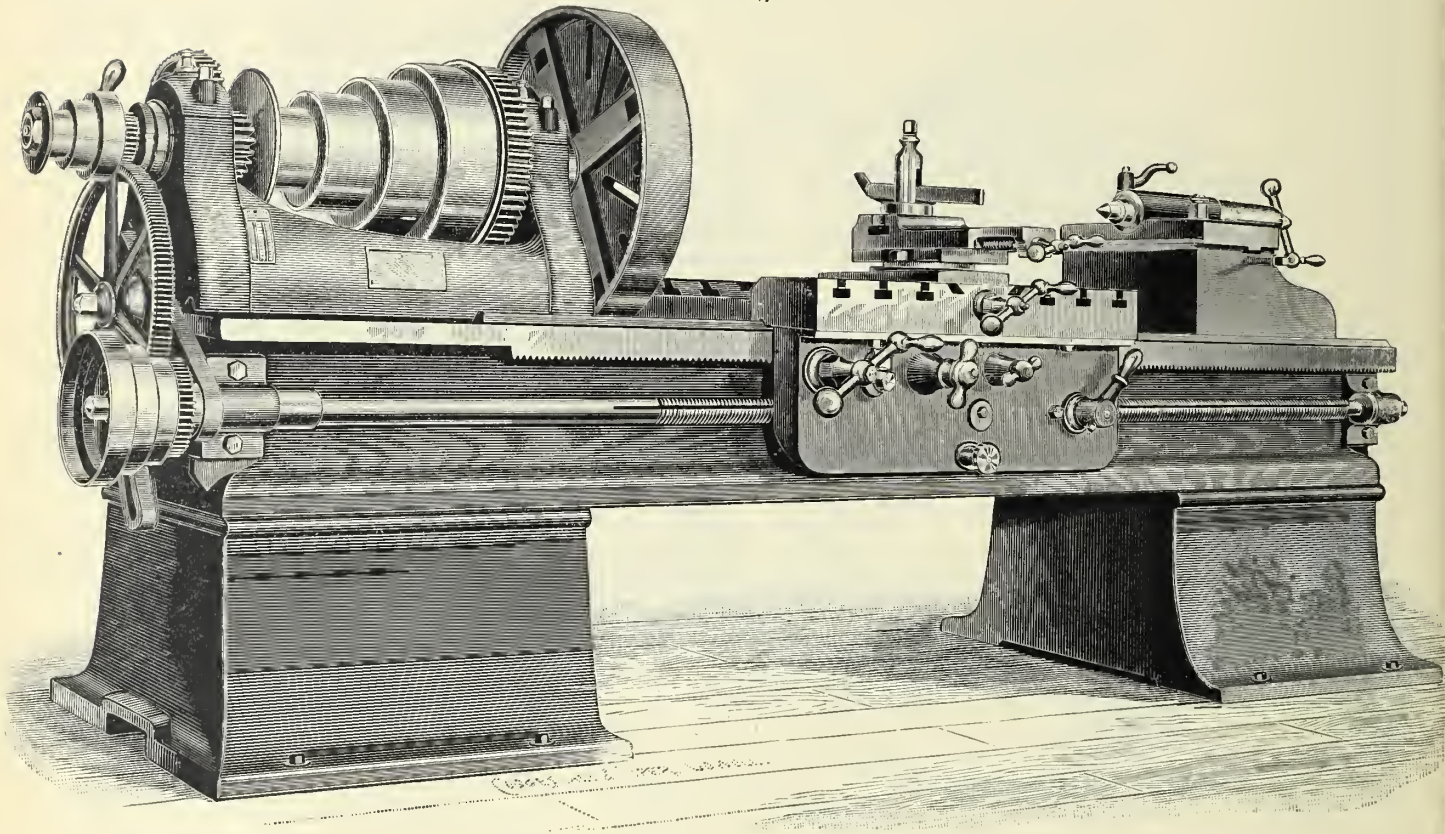
Distance between centers, 8 feet 6 inches.

Rack-gears can be drawn out of the rack, preventing wear on these parts when not required in screw-cutting and other similar work. This does away with the annoyance of revolving handles.

Has friction counter-shaft, with pulleys 14 inches in diameter for 4-inch belt. Should make 100 revolutions per minute. Weight 4000 lbs.

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FIG. 47.



NEW PATTERN 26 INCH SWING ENGINE LATHE, ON 12 FOOT BED.

THE above illustration represents an entirely new pattern Engine Lathe, with 26 inch swing, on 12 foot bed. The bearings are large and long, the cones have broad faces, the head is very strongly back geared, the gearings are cut coarse, and are still running. It has friction feed, inside power cross feed, compound rest to move in any horizontal direction, very strong gibbed carriage, screw cutting, is fitted with open and shut nut, consequently screw and carriage can be connected at any point. The feed is unusually strong and durable, and can be changed from right to left, or vice versa, in an instant.

The spindle is forged cast steel, the rack and pinion gear for same are of steel (cut from the solid), as well as other parts that require great strength and are exposed to wear; the important sliding parts are scraped together, not ground with emery. Each Lathe is furnished with large and small face plate, compound rest, center rest, full set of screw cutting gears, counter shaft with patent friction pulleys, wrenches, etc.

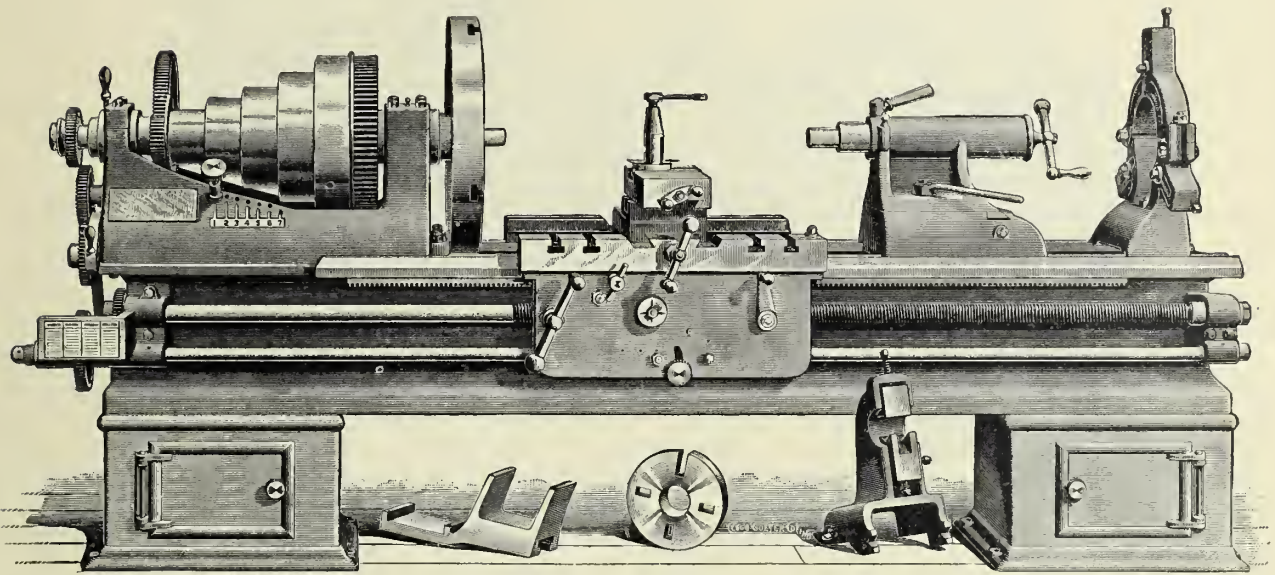
The friction pulleys are 16 x 4½ inches, and should make about 110 revolutions per minute. Beds can be furnished as required up to and including 30 feet in length.

SPECIFICATIONS.

Swing over ways,	- - - - -	26 inches
Length of bed,	- - - - -	12 feet
Turns,	- - - - -	7 feet
Weight, about,	- - - - -	5,100 lbs.
Diameter front bearing,	- - - - -	4 inches
Diameter back bearing,	- - - - -	3 inches
Diameter of spindle through cone,	- - - - -	3¼ inches
Width of cone belt,	- - - - -	4 inches
Distance between head and tail stock V's,	- - - - -	14 inches
Carriage has solid bearings on ways,	- - - - -	34 inches

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FIG. 48.



27 AND 30 INCH PATTERN ENGINE LATHE.

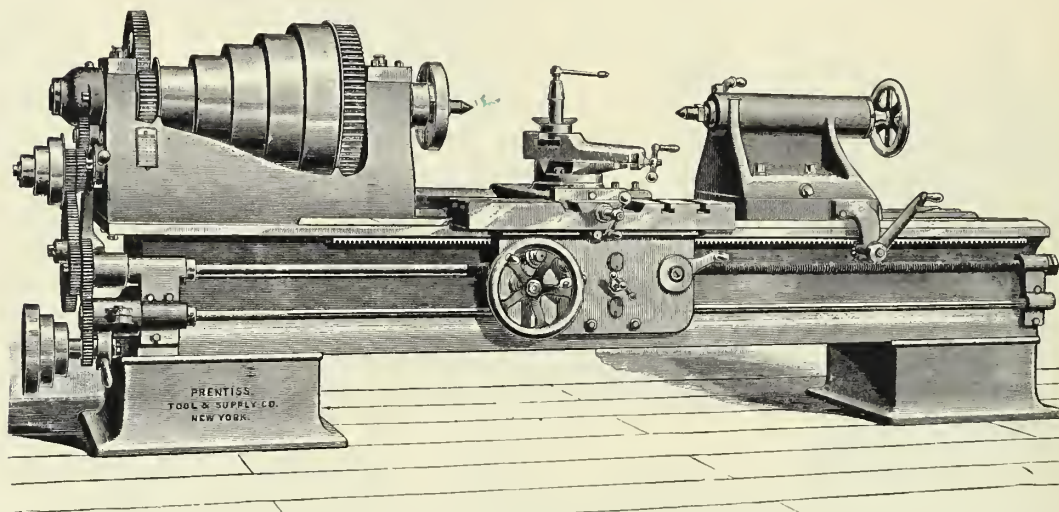
These Lathes are the same in general design and embody the same features as described on pages 36 and 37.

SPECIFICATIONS.

	27 INCH SWING, 10 Foot Bed.	30 INCH SWING, 12 Foot Bed.
Size of Lathe,	- - -	- - -
Ratio of back gearing,	- - - 14 to 1	- - - 15 to 1
Cone diameter,	- - - { 16 1/8 in., 13 5/8 in., 11 1/8 in., 8 5/8 in., 6 1/8 in.	- - - { 20 in., 16 3/4 in., 13 1/2 in., 10 1/4 in., 7 in.
Width of belt on cone,	- - - 3 1/2 in.	- - - 4 in.
Hole through spindle,	- - - 2 3/16 in.	- - - 2 1/16 in.
Front bearing of spindle,	- - - 3 1/16 in. diam., 6 1/4 in. long.	- - - 5 in. diam., 7 in. long.
Diameter of tail spindle,	- - - 2 7/8 in.	- - - 3 3/16 in.
Lathe will cut screws from	- - - 1 to 14	- - - 1 to 14
Feeds per inch	- - - 3 to 70	- - - 3 to 64
Weight,	- - - 4500 lbs.	- - - 6000 lbs.
Speed of countershaft,	- - - 125 rev.	- - - 100 rev.
Size of pulleys on countershaft,	- - - 16 x 5 in.	- - - 18 x 5 1/2 in.
Lathe will take between centers,	- - - 5 ft., 6 in.	- - - 7 ft.
Beds made in lengths of	- - - 10-12-14-16-18-20 ft.	- - - 12-14-16-18-20-22 ft.
Swing over carriage,	- - - 18 in.	- - - 21 in.

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FIG. 49.



28 INCH SWING PRENTISS STANDARD ENGINE LATHE.

THESE LATHES are made from new patterns throughout; are attractive and symmetrical in outline, and weight about one-third more than ordinary lathes.

Special attention has been given to combine strength and rigidity with ease of operation.

The journals are large and carefully finished.

Spindles are made of hammered high carbon steel.

Boxes are of the best phosphor bronze, and are so designed that new ones can be substituted at any time and easily set in perfect alignment.

The lead screw and rod and all actuating screws are made of special grade of steel.

The carriage has an extra long bearing on ways; and the compound rest also has a long bearing on carriage.

All standard lathes have a slide at back of bed for taper attachment, which can be used at any part of the bed; is simple, substantial and capable of boring or turning a taper six inches to one foot.

These lathes are provided with variable feed of great range, which is adapted to all kinds of work.

An endless belt is used on feed cones and can be easily tightened without cutting and lacing same.

Automatic cross feed, compound, center, traverse and full swing rests, and countershaft with friction pulleys are furnished with all sizes.

Hollow spindles are furnished when required.

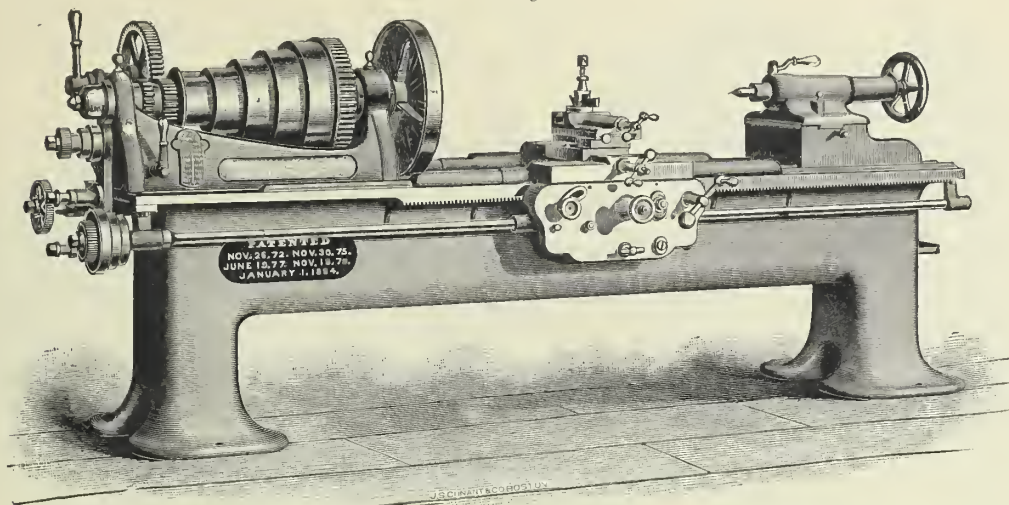
Lathes are made with beds of any even length, varying by two feet.

SPECIFICATIONS.

Size of Lathe,	-	-	-	-	-	-	-	-	28 inches
Swing of Lathe,	-	-	-	-	-	-	-	-	28½ "
Swing over carriage,	-	-	-	-	-	-	-	-	19¾ "
Length of bed,	-	-	-	-	-	-	-	-	10 feet
Turns between centers,	-	-	-	-	-	-	-	-	4 feet 9 inches
Number of steps on cone,	-	-	-	-	-	-	-	-	5
Face of steps on cone,	-	-	-	-	-	-	-	-	3⅞ "
Diameter of largest step,	-	-	-	-	-	-	-	-	16½ "
Cuts threads,	-	-	-	-	-	-	-	-	2 to 20
Diameter of pulleys on countershaft,	-	-	-	-	-	-	-	-	16 inches
Width of belt,	-	-	-	-	-	-	-	-	5 "
Revolutions of countershaft per minute,	-	-	-	-	-	-	-	-	100

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FIG. 50.



PUTNAM STANDARD 28 INCH SWING ENGINE LATHE.

ACTUAL SWING, 29 INCHES.

Note.—Cut does not illustrate latest type of Lathe, see Photo. These Lathes have new compound reversing gear stud for screw cutting.

SPECIFICATIONS.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
8 feet.	20 $\frac{1}{4}$ inches.	2 feet 6 inches.	Without.	6715	8 feet.	20 $\frac{1}{4}$ inches.	2 feet 6 inches.	With.	7015
9 "	20 $\frac{1}{4}$ "	3 " 6 "	"	6955	9 "	20 $\frac{1}{4}$ "	3 " 6 "	"	7255
10 "	20 $\frac{1}{4}$ "	4 " 6 "	"	7195	10 "	20 $\frac{1}{4}$ "	4 " 6 "	"	7495
11 "	20 $\frac{1}{4}$ "	5 " 6 "	"	7435	11 "	20 $\frac{1}{4}$ "	5 " 6 "	"	7735
12 "	20 $\frac{1}{4}$ "	6 " 6 "	"	7675	12 "	20 $\frac{1}{4}$ "	6 " 6 "	"	7975
13 "	20 $\frac{1}{4}$ "	7 " 6 "	"	7915	13 "	20 $\frac{1}{4}$ "	7 " 6 "	"	8215
14 "	20 $\frac{1}{4}$ "	8 " 6 "	"	8155	14 "	20 $\frac{1}{4}$ "	8 " 6 "	"	8455
15 "	20 $\frac{1}{4}$ "	9 " 6 "	"	8395	15 "	20 $\frac{1}{4}$ "	9 " 6 "	"	8695
16 "	20 $\frac{1}{4}$ "	10 " 6 "	"	8635	16 "	20 $\frac{1}{4}$ "	10 " 6 "	"	8935
17 "	20 $\frac{1}{4}$ "	11 " 6 "	"	8875	17 "	20 $\frac{1}{4}$ "	11 " 6 "	"	9175
18 "	20 $\frac{1}{4}$ "	12 " 6 "	"	9115	18 "	20 $\frac{1}{4}$ "	12 " 6 "	"	9415
19 "	20 $\frac{1}{4}$ "	13 " 6 "	"	9355	19 "	20 $\frac{1}{4}$ "	13 " 6 "	"	9655
20 "	20 $\frac{1}{4}$ "	14 " 6 "	"	9595	20 "	20 $\frac{1}{4}$ "	14 " 6 "	"	9895
21 "	20 $\frac{1}{4}$ "	15 " 6 "	"	9835	21 "	20 $\frac{1}{4}$ "	15 " 6 "	"	10135
22 "	20 $\frac{1}{4}$ "	16 " 6 "	"	10075	22 "	20 $\frac{1}{4}$ "	16 " 6 "	"	10375
23 "	20 $\frac{1}{4}$ "	17 " 6 "	"	10315	23 "	20 $\frac{1}{4}$ "	17 " 6 "	"	10615
24 "	20 $\frac{1}{4}$ "	18 " 6 "	"	10555	24 "	20 $\frac{1}{4}$ "	18 " 6 "	"	10855
25 "	20 $\frac{1}{4}$ "	19 " 6 "	"	10795	25 "	20 $\frac{1}{4}$ "	19 " 6 "	"	11095
26 "	20 $\frac{1}{4}$ "	20 " 6 "	"	11035	26 "	20 $\frac{1}{4}$ "	20 " 6 "	"	11335
27 "	20 $\frac{1}{4}$ "	21 " 6 "	"	11275	27 "	20 $\frac{1}{4}$ "	21 " 6 "	"	11575
28 "	20 $\frac{1}{4}$ "	22 " 6 "	"	11515	28 "	20 $\frac{1}{4}$ "	22 " 6 "	"	11815
29 "	20 $\frac{1}{4}$ "	23 " 6 "	"	11755	29 "	20 $\frac{1}{4}$ "	23 " 6 "	"	12055
30 "	20 $\frac{1}{4}$ "	24 " 6 "	"	11995	30 "	20 $\frac{1}{4}$ "	24 " 6 "	"	12295
31 "	20 $\frac{1}{4}$ "	25 " 6 "	"	12235	31 "	20 $\frac{1}{4}$ "	25 " 6 "	"	12535

With Taper Attachment.

With Taper Attachment.

Range of feed, $\frac{1}{80}$ to $1\frac{1}{4}$ inch to one revolution of spindle.
Range of screw cutting, one thread in 12 inches to 16 per inch. Taper attachment, extra. Shafting rest, extra.

No. 1 portable straightening machine, extra.

No. 2 Portable straightening machine, extra.

Traverse rest, extra.

Pulleys on counter are 18 inches diameter, 6 inch face.

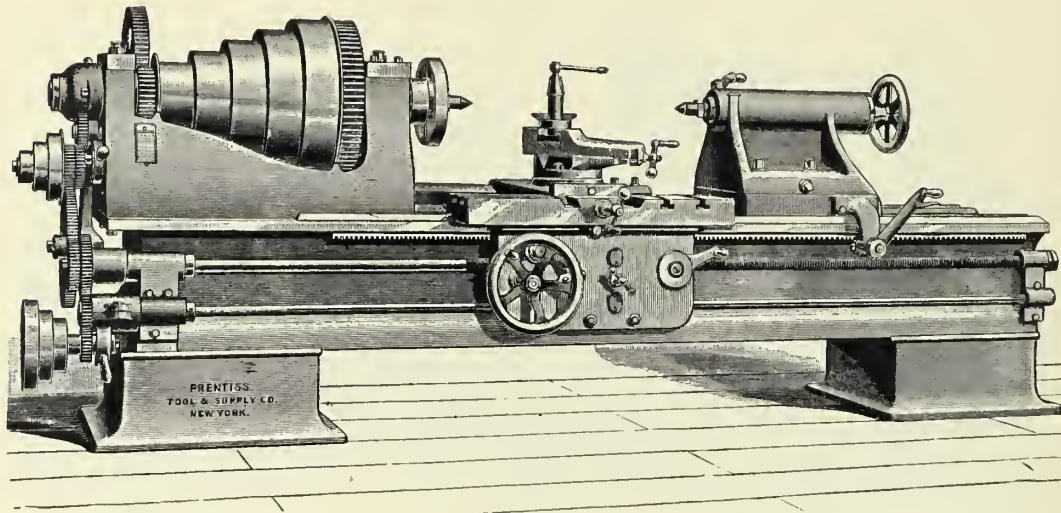
Countershaft should make 60 revolutions per minute.

Reversing speed, 70 revolutions per minute.

Hollow spindle, with $2\frac{1}{16}$ inch hole, extra.

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FIG. 51.



30 INCH SWING PRENTISS STANDARD ENGINE LATHE.

GENERAL DESCRIPTION.

THIS LATHE is made from new patterns throughout ; is attractive and symmetrical in outline, and weighs about one-third more than ordinary Lathes.

Special attention has been given to combine strength and rigidity with ease of operation.

The journals are large and carefully finished.

Spindles are made of hammered high carbon steel.

Boxes are of the best phosphor bronze, and are so designed that new ones can be substituted at any time and easily set in perfect alignment.

The lead screw and rod and all actuating screws are made of a special grade of steel.

The carriage has an extra long bearing on ways ; and the compound rest also has a long bearing on carriage.

All standard lathes have a slide at back of bed for taper attachment which can be used at any part of the bed ; is simple, substantial and capable of boring or turning a taper six inches to one foot.

This Lathe is provided with a variable feed of great range, which is adapted to all kinds of work.

An endless belt is used on feed cones and can be easily tightened without cutting and lacing same.

Automatic cross feed, compound, center, traverse and full swing rests, and countershaft with friction pulleys are furnished.

Hollow spindles are furnished when required.

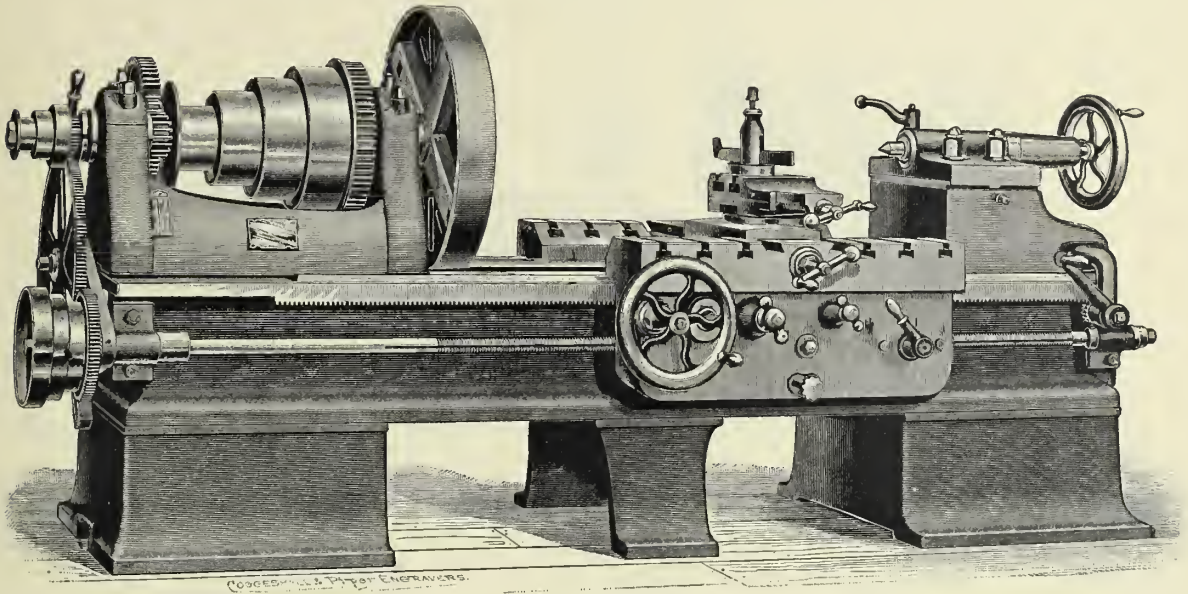
Lathes are made with beds of any even length, varying by two feet.

SPECIFICATIONS.

Size of Lathe,	-	-	-	-	-	-	-	-	-	30 inch
Swing of Lathe,	-	-	-	-	-	-	-	-	-	30½ inches
Swing over carriage,	-	-	-	-	-	-	-	-	-	20¾ inches
Length of bed,	-	-	-	-	-	-	-	-	-	10 feet
Turns between centers,	-	-	-	-	-	-	-	-	-	4 feet 2 ins
Number of steps on cone,	-	-	-	-	-	-	-	-	-	5
Face of steps on cone,	-	-	-	-	-	-	-	-	-	4⅞ inches
Diameter of largest step,	-	-	-	-	-	-	-	-	-	19½ inches
Cuts threads	-	-	-	-	-	-	-	-	-	2 to 20
Diameter of pulleys on countershaft,	-	-	-	-	-	-	-	-	-	16 inches
Width of belt,	-	-	-	-	-	-	-	-	-	5 inches
Revolutions of countershaft,	-	-	-	-	-	-	-	-	-	100

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FIG. 52.



NEW PATTERN 30 INCH SWING ENGINE LATHE ON 12 FOOT BED.

THE above illustration represents an entirely *new pattern* engine Lathe, with 30 inch swing on 12 foot bed.

The bearings are large and long ; the cones have broad faces ; the head is very strongly back geared ; the gearings are cut coarse, and are still running, it has friction feed, inside power cross feed, compound rest to move in any horizontal direction ; very strong gibbed carriage ; screw cutting ; is fitted with open and shut nut, consequently screw and carriage can be connected at any point.

The feed is unusually strong and durable, and can be changed from right to left, or *vice versa*, in an instant.

The spindle is forged cast steel, the rack and pinion gear for same are of steel (cut from the solid), as well as other parts that require great strength and are exposed to wear ; the important sliding parts are scraped together, not ground with emery.

Each Lathe is furnished with large and small face plate, compound rest, center rest, full set of screw cutting gears, countershaft with patent friction pulleys, wrenches, etc.

The friction pulleys are 20 x 6 inches and should make about 80 revolutions per minute.

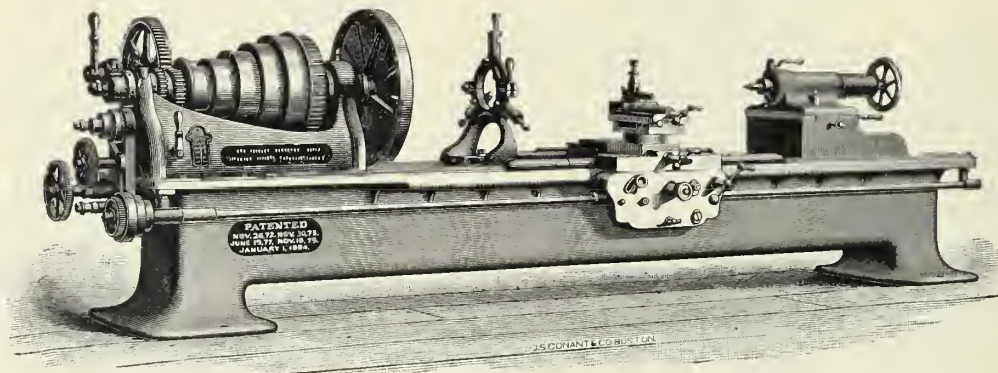
Beds can be furnished as required up to and including 30 feet in length.

SPECIFICATIONS.

Swing over ways,	-	-	-	30 inches	Diameter back bearing,	-	-	-	3¼ inches
Length of bed,	-	-	-	12 feet	Diameter of spindle through cone,	-	-	-	3½ inches
Turns,	-	-	-	6 feet 3 inches	Width of cone belt,	-	-	-	4½ inches
Weight, about	-	-	-	6500 pounds	Distance between head and tail-stock V's,	-	-	-	16 inches
Diameter front bearing,	-	-	-	5 inches	Carriage has solid bearings on ways,	-	-	-	39 inches

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FIG. 53.



PUTNAM STANDARD 30 INCH SWING ENGINE LATHE,

ACTUAL SWING, 31 INCHES.

Note.—See Photo. for latest type of Lathe. These Lathes have our new compound reversing gear stud for Screw Cutting.

SPECIFICATIONS.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
10 feet	20 inches	3 feet 8 inches	Without	8225	10 feet	20 inches	3 feet 8 inches	With	8600
11 "	20 "	4 " 8 "	"	8500	11 "	20 "	4 " 8 "	"	8875
12 "	20 "	5 " 8 "	"	8775	12 "	20 "	5 " 8 "	"	9150
13 "	20 "	6 " 8 "	"	9050	13 "	20 "	6 " 8 "	"	9425
14 "	20 "	7 " 8 "	"	9335	14 "	20 "	7 " 8 "	"	9700
15 "	20 "	8 " 8 "	"	9600	15 "	20 "	8 " 8 "	"	9975
16 "	20 "	9 " 8 "	"	9875	16 "	20 "	9 " 8 "	"	10250
17 "	20 "	10 " 8 "	"	10150	17 "	20 "	10 " 8 "	"	10525
18 "	20 "	11 " 8 "	"	10425	18 "	20 "	11 " 8 "	"	10800
19 "	20 "	12 " 8 "	"	10700	19 "	20 "	12 " 8 "	"	11075
20 "	20 "	13 " 8 "	"	10975	20 "	20 "	13 " 8 "	"	11350
21 "	20 "	14 " 8 "	"	11250	21 "	20 "	14 " 8 "	"	11625
22 "	20 "	15 " 8 "	"	11525	22 "	20 "	15 " 8 "	"	11900
23 "	20 "	16 " 8 "	"	11800	23 "	20 "	16 " 8 "	"	12175
24 "	20 "	17 " 8 "	"	12075	24 "	20 "	17 " 8 "	"	12450
25 "	20 "	18 " 8 "	"	12350	25 "	20 "	18 " 8 "	"	12725
26 "	20 "	19 " 8 "	"	12625	26 "	20 "	19 " 8 "	"	13000
27 "	20 "	20 " 8 "	"	12910	27 "	20 "	20 " 8 "	"	13275
28 "	20 "	21 " 8 "	"	13175	28 "	20 "	21 " 8 "	"	13550
29 "	20 "	22 " 8 "	"	13450	29 "	20 "	22 " 8 "	"	13825
30 "	20 "	23 " 8 "	"	13725	30 "	20 "	23 " 8 "	"	14100
31 "	20 "	24 " 8 "	"	14000	31 "	20 "	24 " 8 "	"	14375

Taper attachment, extra.

Range of screw cutting, one thread in 12 inches to 16 per inch.

Range of feed, $\frac{1}{64}$ inch to $\frac{1}{4}$ inch to one revolution of spindle.

Triple-gear head, extra. Traverse rest, extra.

Pulleys on counter are 20 inches diameter, 6 inch face.

Countershaft should make 55 revolutions per minute.

Reversing speed, 65 revolutions per minute.

Hollow spindle, with $2\frac{1}{8}$ inch hole, extra.



30 INCH SWING ENGINE LATHE.

ACTUAL SWING, 31 INCHES.

Note.—For illustration of this Lathe see Photo.

SPECIFICATIONS.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
10 feet.	20 inches.	3 feet 8 inches	Without.	8225	10 feet.	20 inches.	3 feet 8 inches	With.	8600
11 "	20 "	4 " 8 "	"	8500	11 "	20 "	4 " 8 "	"	8875
12 "	20 "	5 " 8 "	"	8775	12 "	20 "	5 " 8 "	"	9150
13 "	20 "	6 " 8 "	"	9050	13 "	20 "	6 " 8 "	"	9425
14 "	20 "	7 " 8 "	"	9335	14 "	20 "	7 " 8 "	"	9700
15 "	20 "	8 " 8 "	"	9600	15 "	20 "	8 " 8 "	"	9975
16 "	20 "	9 " 8 "	"	9875	16 "	20 "	9 " 8 "	"	10250
17 "	20 "	10 " 8 "	"	10150	17 "	20 "	10 " 8 "	"	10525
18 "	20 "	11 " 8 "	"	10425	18 "	20 "	11 " 8 "	"	10800
19 "	20 "	12 " 8 "	"	10700	19 "	20 "	12 " 8 "	"	11075
20 "	20 "	13 " 8 "	"	10975	20 "	20 "	13 " 8 "	"	11350
21 "	20 "	14 " 8 "	"	11250	21 "	20 "	14 " 8 "	"	11625
22 "	20 "	15 " 8 "	"	11525	22 "	20 "	15 " 8 "	"	11900
23 "	20 "	16 " 8 "	"	11800	23 "	20 "	16 " 8 "	"	12175
24 "	20 "	17 " 8 "	"	12075	24 "	20 "	17 " 8 "	"	12450
25 "	20 "	18 " 8 "	"	12350	25 "	20 "	18 " 8 "	"	12725
26 "	20 "	19 " 8 "	"	12625	26 "	20 "	19 " 8 "	"	13000
27 "	20 "	20 " 8 "	"	12900	27 "	20 "	20 " 8 "	"	13275
28 "	20 "	21 " 8 "	"	13175	28 "	20 "	21 " 8 "	"	13550
29 "	20 "	22 " 8 "	"	13450	29 "	20 "	22 " 8 "	"	13825
30 "	20 "	23 " 8 "	"	13725	30 "	20 "	23 " 8 "	"	14100
31 "	20 "	24 " 8 "	"	14000	31 "	20 "	24 " 8 "	"	14375

Range of screw cutting, 1 to 16 per inch.

Taper attachment, traverse rest, and hollow spindle, with $2\frac{1}{8}$ inch hole, extra.

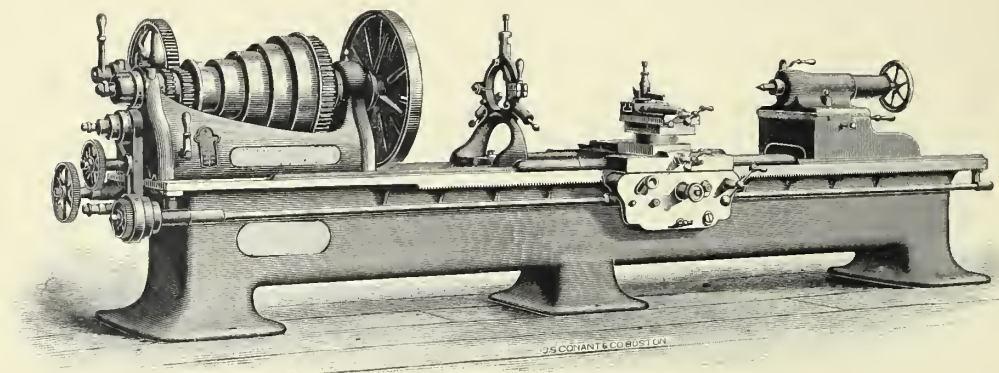
Pulleys on counter, 20 inches diameter, 6 inch face.

Countershaft should make 55 revolutions per minute.

Reversing speed, 65 revolutions per minute.

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FIG. 54.



PUTNAM STANDARD 33 INCH SWING ENGINE LATHE.

ACTUAL SWING, 34½ INCHES.

Note—Cut does not illustrate latest type of Lathe, see Photo. These Lathes have new compound-reversing gear-stud for screw cutting.

SPECIFICATIONS.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
10 feet.	24¾ inches.	3 feet 8 inches.	Without.	10225	10 feet	24¾ inches.	3 feet 8 inches.	With.	10600
11 "	24¾ "	4 " 8 "	"	10500	11 "	24¾ "	4 " 8 "	"	10875
12 "	24¾ "	5 " 8 "	"	10775	12 "	24¾ "	5 " 8 "	"	11150
13 "	24¾ "	6 " 8 "	"	11050	13 "	24¾ "	6 " 8 "	"	11425
14 "	24¾ "	7 " 8 "	"	11335	14 "	24¾ "	7 " 8 "	"	11700
15 "	24¾ "	8 " 8 "	"	11600	15 "	24¾ "	8 " 8 "	"	11975
16 "	24¾ "	9 " 8 "	"	11875	16 "	24¾ "	9 " 8 "	"	12250
17 "	24¾ "	10 " 8 "	"	12150	17 "	24¾ "	10 " 8 "	"	12525
18 "	24¾ "	11 " 8 "	"	12425	18 "	24¾ "	11 " 8 "	"	12800
19 "	24¾ "	12 " 8 "	"	12700	19 "	24¾ "	12 " 8 "	"	13075
20 "	24¾ "	13 " 8 "	"	12975	20 "	24¾ "	13 " 8 "	"	13350
21 "	24¾ "	14 " 8 "	"	13250	21 "	24¾ "	14 " 8 "	"	13625
22 "	24¾ "	15 " 8 "	"	13525	22 "	24¾ "	15 " 8 "	"	13900
23 "	24¾ "	16 " 8 "	"	13800	23 "	24¾ "	16 " 8 "	"	14175
24 "	24¾ "	17 " 8 "	"	14075	24 "	24¾ "	17 " 8 "	"	14450
25 "	24¾ "	18 " 8 "	"	14350	25 "	24¾ "	18 " 8 "	"	14725
26 "	24¾ "	19 " 8 "	"	14625	26 "	24¾ "	19 " 8 "	"	15000
27 "	24¾ "	20 " 8 "	"	14900	27 "	24¾ "	20 " 8 "	"	15275
28 "	24¾ "	21 " 8 "	"	15175	28 "	24¾ "	21 " 8 "	"	15550
29 "	24¾ "	22 " 8 "	"	15450	29 "	24¾ "	22 " 8 "	"	15825
30 "	24¾ "	23 " 8 "	"	15725	30 "	24¾ "	23 " 8 "	"	16100
31 "	24¾ "	24 " 8 "	"	16000	31 "	24¾ "	24 " 8 "	"	16375

Range of screw cutting, one thread in 12 in. to 16 per in.
Range of feed, $\frac{1}{16}$ to $1\frac{1}{4}$ in. to one revolution of spindle.
Triple-gear head, traverse rest, and hollow spindle, $2\frac{1}{16}$ inch hole, extra.

Pulleys on counter, 20 in diameter, 6 in. face.
Countershaft should make 55 revolutions per minute.
Reversing speed, 65 revolutions per minute.
Taper attachment, extra.



STANDARD 36 INCH SWING ENGINE LATHE.

ACTUAL SWING, 37 INCHES.

Note.—See Photo for latest type of Lathe. These Lathes have new compound reversing gear stud for screw cutting.

SPECIFICATIONS.

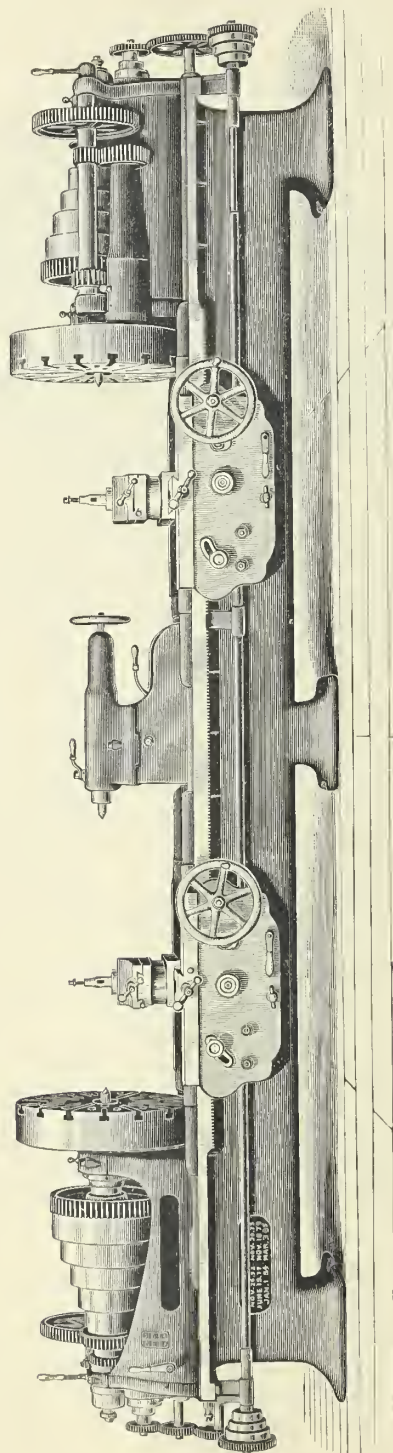
Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
10 feet.	26 inches.	3 feet 8 inches.	Without.	10855	10 feet.	26 inches.	3 feet 8 inches.	With.	11230
11 "	26 "	4 " 8 "	"	11130	11 "	26 "	4 " 8 "	"	11505
12 "	26 "	5 " 8 "	"	11405	12 "	26 "	5 " 8 "	"	11780
13 "	26 "	6 " 8 "	"	11680	13 "	26 "	6 " 8 "	"	12055
14 "	26 "	7 " 8 "	"	11955	14 "	26 "	7 " 8 "	"	12330
15 "	26 "	8 " 8 "	"	12230	15 "	26 "	8 " 8 "	"	12605
16 "	26 "	9 " 8 "	"	12505	16 "	26 "	9 " 8 "	"	12880
17 "	26 "	10 " 8 "	"	12780	17 "	26 "	10 " 8 "	"	13155
18 "	26 "	11 " 8 "	"	13055	18 "	26 "	11 " 8 "	"	13430
19 "	26 "	12 " 8 "	"	13330	19 "	26 "	12 " 8 "	"	13705
20 "	26 "	13 " 8 "	"	13605	20 "	26 "	13 " 8 "	"	13980
21 "	26 "	14 " 8 "	"	13880	21 "	26 "	14 " 8 "	"	14255
22 "	26 "	15 " 8 "	"	14155	22 "	26 "	15 " 8 "	"	14530
23 "	26 "	16 " 8 "	"	14430	23 "	26 "	16 " 8 "	"	14805
24 "	26 "	17 " 8 "	"	14705	24 "	26 "	17 " 8 "	"	15080
25 "	26 "	18 " 8 "	"	14980	25 "	26 "	18 " 8 "	"	15355
26 "	26 "	19 " 8 "	"	15255	26 "	26 "	19 " 8 "	"	15630
27 "	26 "	20 " 8 "	"	15630	27 "	26 "	20 " 8 "	"	15905
28 "	26 "	21 " 8 "	"	15905	28 "	26 "	21 " 8 "	"	16180
29 "	26 "	22 " 8 "	"	16180	29 "	26 "	22 " 8 "	"	16455
30 "	26 "	23 " 8 "	"	16455	30 "	26 "	23 " 8 "	"	16730
31 "	26 "	24 " 8 "	"	16730	31 "	26 "	24 " 8 "	"	17005

Range of screw cutting, one thread in 12 in. to 16 per in.
 Range of feed, $\frac{1}{8}$ to $1\frac{1}{4}$ in. to one revolution of spindle.
 Triple-gear head, traverse rest and hollow spindle, $2\frac{1}{8}$ inch hole, extra.

Pulleys on counter are 20 in. diameter, 6 in. face.
 Countershaft should make 50 revolutions per minute.
 Reversing speed, 60 revolutions per minute.
 Taper attachment, extra.

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FIG. 55.

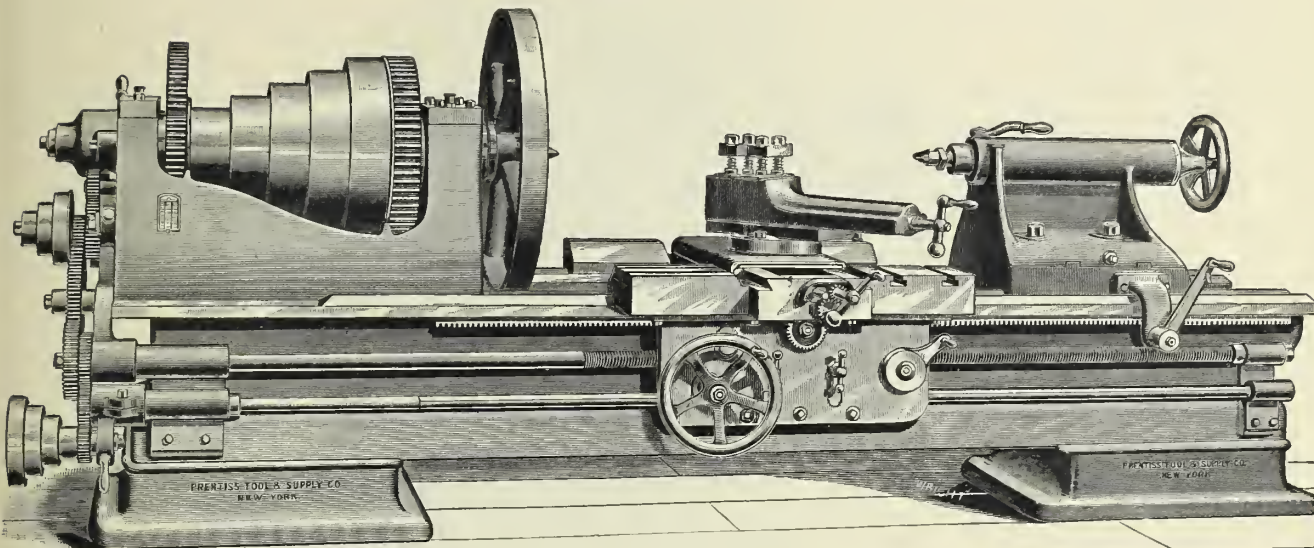


SPECIAL DOUBLE HEADED 36 INCH SWING PUTNAM STANDARD ENGINE LATHE.

For General Specifications see 36 Inch Putnam Standard Engine Lathe, Page 55.

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FIG. 56.



38 AND 40 INCH PATTERN PRENTISS STANDARD ENGINE LATHES.

THIS LATHE is made from new patterns throughout; is attractive and symmetrical in outline, and weighs about one-third more than ordinary lathes of the same capacity.

Special attention has been given to combine strength and rigidity with ease of operation.

The journals are large and carefully finished.

Spindles are made of hammered high carbon steel.

Boxes are of the best phosphor bronze, and are so designed that new ones can be substituted at any time and easily set in perfect alignment.

The lead screw and rod and all actuating screws are made of special grade of steel.

The carriage has an extra long bearing on ways; and the compound rest also has a long bearing on carriage.

Slide at back of bed for taper attachment, which can be used at any part of the bed; it is simple, substantial and capable of boring or turning a taper six inches to one foot.

Provided with variable feed of great range, which is adapted to all kinds of work.

An endless belt is used on feed cones and can be easily tightened without cutting and lacing same.

Automatic cross feed, compound center, traverse and full swing rests, and countershaft with friction pulleys are furnished.

Hollow spindles are furnished when required. This Lathe is furnished with automatic angular feed in compound rest instead of taper attachment.

Lathes are made with beds of any even length, varying by two feet.

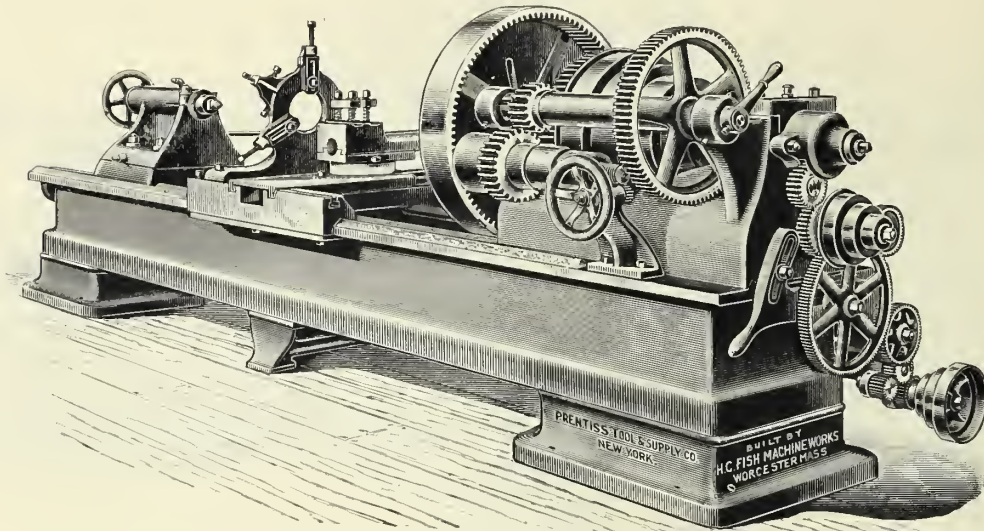
SPECIFICATIONS.

Size of Lathe,	-	-	-	38 Inch
Swing of Lathe,	-	-	-	36½ inches
Swing over carriage,	-	-	-	22¾ inches
Length of bed,	-	-	-	12 feet
Turns between centers,	-	-	-	5 feet 2 inches
Number of steps on cone,	-	-	-	5
Face of steps on cone,	-	-	-	4¾ inches
Diameter of largest step,	-	-	-	22 inches
Cuts threads,	-	-	-	2 to 16
Diameter of pulleys on countershaft,	-	-	-	18 inches
Width of belt,	-	-	-	6 inches
Revolutions of countershaft,	-	-	-	90
Weight,	-	-	-	10000 pounds

Size of Lathe,	-	-	-	40 Inch
Swing of Lathe,	-	-	-	40½ inches
Swing over carriage,	-	-	-	25 inches
Length of bed,	-	-	-	12 feet
Turns between centers,	-	-	-	5 feet 2 inches
Number of steps on cone,	-	-	-	5
Face of steps on cone,	-	-	-	4¾ inches
Diameter of largest step,	-	-	-	22 inches
Cuts threads,	-	-	-	2 to 16
Diameter of pulleys on countershaft,	-	-	-	18 inches
Width of belt,	-	-	-	6 inches
Revolutions of countershaft,	-	-	-	90
Weight,	-	-	-	13000 pounds

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FIG. 57.



38 INCH SWING PRENTISS STANDARD ENGINE LATHE,

ON 12 FOOT BED, WITH TRIPLE GEARS.

THIS LATHE is made from new patterns throughout; is attractive and symmetrical in outline, and weighs about one-third more than ordinary lathes.

Special attention has been given to combine strength and rigidity with ease of operation.

The Journals are large and carefully finished.

Spindles are made of hammered high carbon steel.

Boxes are of the best phosphor bronze, and are so designed that new ones can be substituted at any time and easily set in perfect alignment.

The lead screw and rod and all actuating screws are made of special grade of steel.

The carriage has an extra long bearing on ways; and the compound rest also has a long bearing on carriage.

An automatic angular feed is furnished for operating compound rest.

This Lathe is provided with variable feed of great range, which is adapted to all kinds of work.

An endless belt is used on feed cones and can be easily tightened without cutting and lacing same.

It has triple gears, automatic cross feed, compound center, traverse and full swing rests, and countershaft with friction pulleys are furnished.

Hollow spindles are furnished when required.

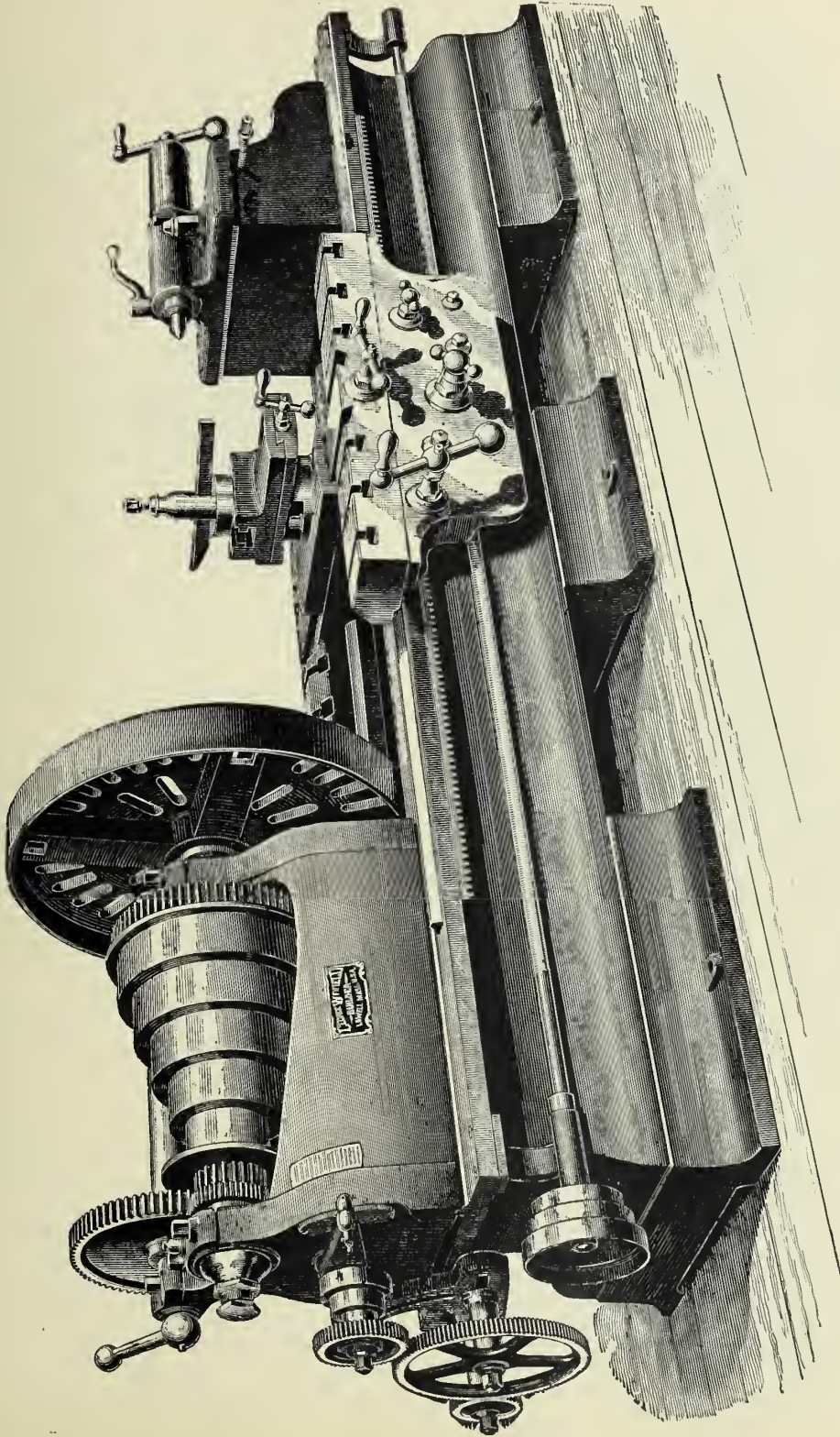
Lathes are made with beds of any even length, varying by two feet.

SPECIFICATIONS.

Size of Lathe,	-	-	-	-	-	-	-	-	38 inches
Swing of Lathe,	-	-	-	-	-	-	-	-	38½ inches
Swing over carriage,	-	-	-	-	-	-	-	-	23 inches
Length of bed,	-	-	-	-	-	-	-	-	12 feet
Turns between centers,	-	-	-	-	-	-	-	-	5 feet 2 inches
Number of steps on cone,	-	-	-	-	-	-	-	-	5
Face of steps on cone,	-	-	-	-	-	-	-	-	4¾ inches
Diameter of largest step,	-	-	-	-	-	-	-	-	22 inches
Cuts thread,	-	-	-	-	-	-	-	-	2 to 16
Diameter of pulleys on countershaft,	-	-	-	-	-	-	-	-	18 inches
Width of belt,	-	-	-	-	-	-	-	-	6 inches
Revolutions of countershaft,	-	-	-	-	-	-	-	-	90
Weight,	-	-	-	-	-	-	-	-	12000 lbs.

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FIG. 58



38 INCH SWING ENGINE LATHE, ON 14 FOOT BED.

THIS CUT represents a 38 inch swing Engine Lathe on 14 foot bed. It is screw cutting and has rod feed, inside power cross feed and compound rest. This Lathe is furnished with large and small face plate, center rest, side block to turn full swing of Lathe, full set of screw gears, countershaft with friction pulleys, wrenches, etc.

The Lathe has a five section cone to take 4 inch belt, front bearing $4\frac{3}{4}$ inches diameter by 7 inches long, the dead spindle is $3\frac{1}{2}$ inches diameter, carriage has a solid bearing of 45 inches on the ways, the spindles are forged steel, the boxes are bronze metal, the rack is steel cut from the solid, the lead screw, feed rod, and all other working screws are steel. Size of pulleys on countershaft, 18 x 6 inches; speed of same, 80 revolutions per minute.

We furnish these Lathes with beds of any desired length.

Weight, complete on 14 foot bed, 10,000 pounds.

This is a detailed black and white engraving of a large industrial machine, likely a screw-cutting lathe. The machine is oriented vertically in the image. At the top, there is a large hand crank with a spoked wheel. Below this, a complex arrangement of gears and shafts is visible. A large, prominent gear with many teeth is located on the left side. The machine's body is made of heavy metal plates with various bolts, nuts, and adjustment screws. A long, horizontal shaft runs through the center of the machine. At the bottom, there are more gears and a smaller hand crank. The entire machine is mounted on a sturdy base. The engraving is highly detailed, showing the texture of the metal and the precision of the mechanical components.

THE accompanying cut represents a 40 inch swing engine lathe on 14 foot bed. This Lathe is triple geared; the spindle can be driven from open belt by back gears or with the triple gearing as required. The triple gearing is not shown in the cut, excepting the faceplate gear, but by the simple movement of a lever on the back side of the Lathe, the pinion is instantly thrown in or out of mesh.

The bearings are large and long, the cones have broad faces, the head is very strongly back and triple geared, the gearing is cut coarse and is simple movement of a lever on the back side of the frame, the pinion is instantly thrown in or out of mesh.

The feed is unusually strong and durable, and changed from right to left, or *vice versa*, in an instant.

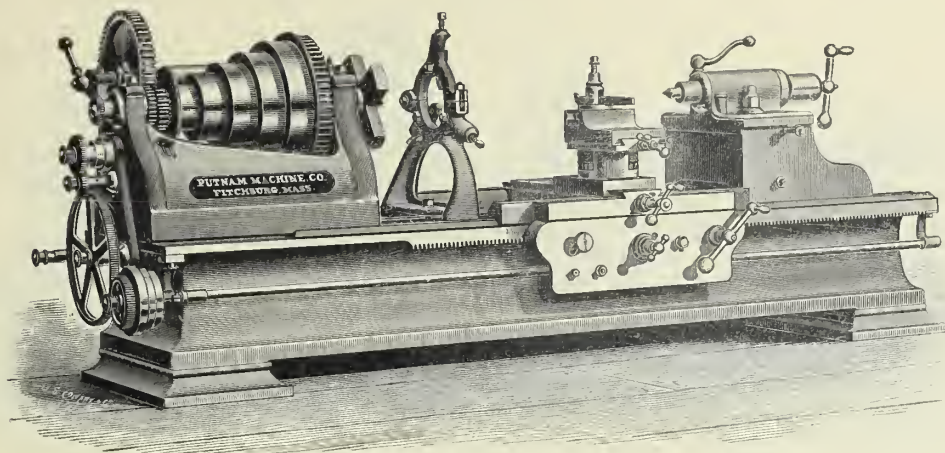
The feed is unusually strong and changed from right to left, or vice versa, at will. The spindle is forged cast steel, the feed rack and pinion gear for same are of steel (cut from the solid), as well as other parts that require great strength and are exposed to wear: the important sliding parts are scraped together, not ground with emery.

Each Lathe is furnished with large and small faceplate, rest, center rest, full set of screw cutting gears, countershaft with patent friction pulleys, wrenches, etc. Beds can be furnished as required up to and including 30 feet in length.

Swing over ways,	-	-	-	40 inches	Diameter of spindle through cone,	-	5½ inches
Length of bed,	-	-	-	14 feet	Width of cone belt,	-	5 inches
Turns, -	-	-	-	6 feet	Distance between head and tailstock V's,	-	22 inches
Diameter front bearing,	-	-	-	7 inches	Carriage has solid bearings on ways,	-	48 inches
Diameter back bearing,	-	-	-	4¾ inches	Weight,	-	13800

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FIG. 60.



42 INCH SWING ENGINE LATHE.

COMPOUND REST.

SPECIFICATIONS.

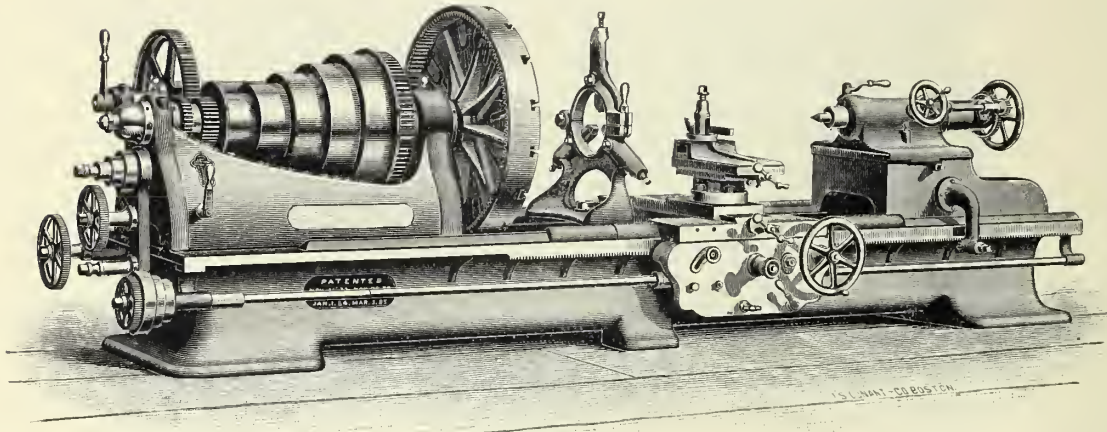
Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
10 feet.	30 inches.	3 feet 8 inches.	Without.	11680
12 "	30 "	5 " 8 "	"	12280
14 "	30 "	7 " 8 "	"	12880
16 "	30 "	9 " 8 "	"	13480
18 "	30 "	11 " 8 "	"	14080
20 "	30 "	13 " 8 "	"	14680
22 "	30 "	15 " 8 "	"	15280
24 "	30 "	17 " 8 "	"	15880
26 "	30 "	19 " 8 "	"	16480
28 "	30 "	21 " 8 "	"	17080
30 "	30 "	23 " 8 "	"	17680
10 "	30 "	3 " 8 "	With.	12080
12 "	30 "	5 " 8 "	"	12700
14 "	30 "	7 " 8 "	"	13320
16 "	30 "	9 " 8 "	"	13940
18 "	30 "	11 " 8 "	"	14560
20 "	30 "	13 " 8 "	"	15180
22 "	30 "	15 " 8 "	"	15800
24 "	30 "	17 " 8 "	"	16420
26 "	30 "	19 " 8 "	"	17040
28 "	30 "	21 " 8 "	"	17660
30 "	30 "	23 " 8 "	"	18280

Triple Gears.

Traverse rest, triple geared head and shafting rest, extra.
 Pulleys on counter, 24 inch diameter, 6 inch face.
 Countershaft should make 55 revolutions per minute.
 Reversing speed, 75 revolutions per minute.

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FIG. 61.



STANDARD 46 INCH SWING ENGINE LATHE.

ACTUAL SWING, 47½ INCHES. TAILSTOCK SPINDLE OPERATED BY SIDE HAND-WHEEL.

SPECIFICATIONS.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.	Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
12 feet	34¼ inches	3 feet 7½ inches	Without	17000	12 feet	34¼ inches	3 feet 7½ inches	With	18200
14 "	34¼ "	5 " 7½ "	"	18200	14 "	34¼ "	5 " 7½ "	"	19400
15 "	34¼ "	6 " 7½ "	"	18800	15 "	34¼ "	6 " 7½ "	"	20000
16 "	34¼ "	7 " 7½ "	"	19400	16 "	34¼ "	7 " 7½ "	"	20600
17 "	34¼ "	8 " 7½ "	"	20000	17 "	34¼ "	8 " 7½ "	"	21200
18 "	34¼ "	9 " 7½ "	"	20600	18 "	34¼ "	9 " 7½ "	"	21800
19 "	34¼ "	10 " 7½ "	"	21200	19 "	34¼ "	10 " 7½ "	"	22400
20 "	34¼ "	11 " 7½ "	"	21800	20 "	34¼ "	11 " 7½ "	"	23000
21 "	34¼ "	12 " 7½ "	"	22400	21 "	34¼ "	12 " 7½ "	"	23600
22 "	34¼ "	13 " 7½ "	"	23000	22 "	34¼ "	13 " 7½ "	"	24200
23 "	34¼ "	14 " 7½ "	"	23600	23 "	34¼ "	14 " 7½ "	"	24800
24 "	34¼ "	15 " 7½ "	"	24200	24 "	34¼ "	15 " 7½ "	"	25400
25 "	34¼ "	16 " 7½ "	"	24800	25 "	34¼ "	16 " 7½ "	"	26000
26 "	34¼ "	17 " 7½ "	"	25400	26 "	34¼ "	17 " 7½ "	"	26600
27 "	34¼ "	18 " 7½ "	"	26000	27 "	34¼ "	18 " 7½ "	"	27200
28 "	34¼ "	19 " 7½ "	"	26600	28 "	34¼ "	19 " 7½ "	"	27800
29 "	34¼ "	20 " 7½ "	"	27200	29 "	34¼ "	20 " 7½ "	"	28400
30 "	34¼ "	21 " 7½ "	"	27800	30 "	34¼ "	21 " 7½ "	"	29000
31 "	34¼ "	22 " 7½ "	"	28400	31 "	34¼ "	22 " 7½ "	"	29600
32 "	34¼ "	23 " 7½ "	"	29000	32 "	34¼ "	23 " 7½ "	"	30200
33 "	34¼ "	24 " 7½ "	"	29600	33 "	34¼ "	24 " 7½ "	"	30800
34 "	34¼ "	25 " 7½ "	"	30200	34 "	34¼ "	25 " 7½ "	"	31400
35 "	34¼ "	26 " 7½ "	"	30800	35 "	34¼ "	26 " 7½ "	"	32000
36 "	34¼ "	27 " 7½ "	"	31400	36 "	34¼ "	27 " 7½ "	"	32600
37 "	34¼ "	28 " 7½ "	"	32000	37 "	34¼ "	28 " 7½ "	"	33200
39 "	34¼ "	30 " 7½ "	"	33200	39 "	34¼ "	30 " 7½ "	"	34400

Range of screw cutting, one thread in 12 ins. to 16 per in.

Range of feed, ⅛ to 2½ ins. to one revolution of spindle.

Triple geared headstock, and tailstock spindle operated by side hand-wheel, extra.

Traverse rest extra.

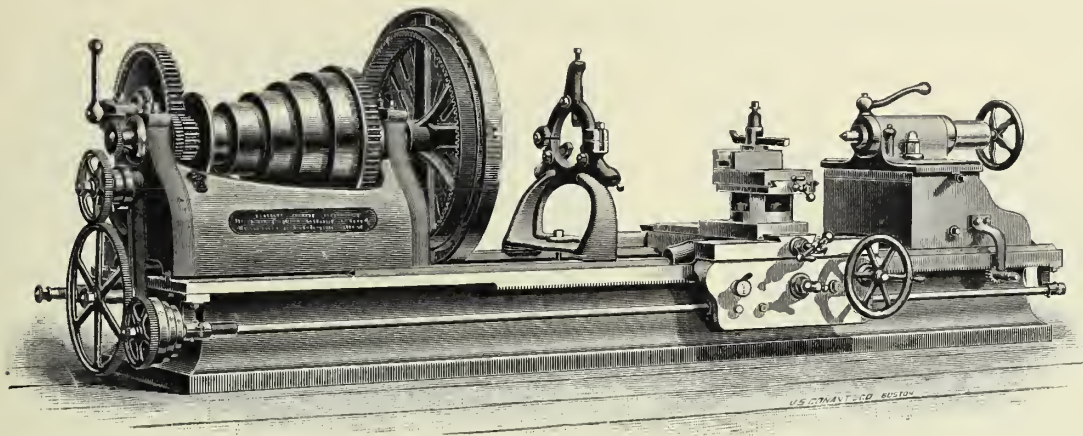
Pulleys on counter, 26 inches diameter, 8 inches face.

Counter should make 40 revolutions per minute.

Reversing speed, 50 revolutions per minute.

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FIG. 62.



48 INCH SWING ENGINE LATHES,

WITH SCREW CUTTING ATTACHMENT. TRIPLE GEARED HEADSTOCK AND COMPOUND REST.

SPECIFICATIONS.

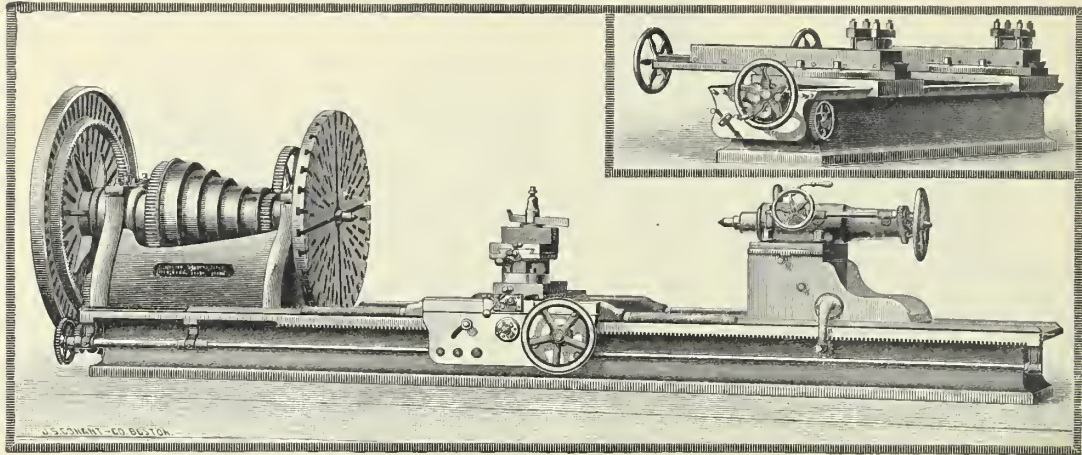
Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
10 feet.	35 inches.	3 feet.	Without.	13875
12 "	35 "	5 "	"	15075
14 "	35 "	7 "	"	16275
16 "	35 "	9 "	"	17475
18 "	35 "	11 "	"	18675
20 "	35 "	13 "	"	19875
22 "	35 "	15 "	"	21075
24 "	35 "	17 "	"	22275
26 "	35 "	19 "	"	23475
28 "	35 "	21 "	"	24675
30 "	35 "	23 "	"	25875
10 "	35 "	3 "	With.	15075
12 "	35 "	5 "	"	16275
14 "	35 "	7 "	"	17535
16 "	35 "	9 "	"	18765
18 "	35 "	11 "	"	19995
20 "	35 "	13 "	"	21225
22 "	35 "	15 "	"	22455
24 "	35 "	17 "	"	23685
26 "	35 "	19 "	"	24915
28 "	35 "	21 "	"	26145
30 "	35 "	23 "	"	27375

Triple Gears.

Traverse rest, triple geared head and shafting rest, extra.
Pulleys on counter, 26 inch diameter, 8 inch face.
Countershaft should make 50 revolutions per minute.
Reversing speed, 70 revolutions per minute.

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FIG. 63.



EXTRA HEAVY TRIPLE-GEARED 54 AND 60 INCH PATTERN ENGINE LATHES.

BACK FACEPLATE AND PIT LATHE ATTACHMENTS. TAILSTOCK SPINDLE OPERATED BY SIDE HAND WHEEL.

SPECIFICATIONS.

54 INCH SWING ENGINE LATHES.

Compound Rest.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
14 feet.	34 inches.	7½ feet.	Without.	18900
16 "	34 "	9½ "	"	19750
18½ "	34 "	12 "	"	20600
21 "	34 "	14½ "	"	21450
23½ "	34 "	17 "	"	22300
26 "	34 "	19½ "	"	23150
28½ "	34 "	22 "	"	24000
14 "	34 "	7½ "	With.	20100
16 "	34 "	9½ "	"	20950
18½ "	34 "	12 "	"	21800
21 "	34 "	14½ "	"	22650
23½ "	34 "	17 "	"	23500
26 "	34 "	19½ "	"	24350
28½ "	34 "	22 "	"	25200

60 INCH SWING ENGINE LATHES.

Compound Rest.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Screw Cutting.	Weight.
17 feet.	40 inches.	9 feet.	Without.	25250
19½ "	40 "	11½ "	"	26250
22 "	40 "	14 "	"	27250
24½ "	40 "	16½ "	"	28250
27 "	40 "	19 "	"	29250
29½ "	40 "	21½ "	"	30250
17 "	40 "	9 "	With.	26450
19½ "	40 "	11½ "	"	27450
22 "	40 "	14 "	"	28450
24½ "	40 "	16½ "	"	29450
27 "	40 "	19 "	"	30450
29½ "	40 "	21½ "	"	31450

Triple geared head and tailstock spindle operated by side hand-wheel, extra.

Pulleys on counter, 36 inches diameter, 7 inch face. Countershaft should make 48 revolutions per minute.

Reversing speed, 60 revolutions per minute.

Face plate on back end headstock for pit lathe, extra.

Lathe 22 ft. bed, with back faceplate, weight 30000 lbs.

Lathe 22 ft. bed, with back faceplate, bed for pit lathe, with 2 compound slide rests, power feed, etc., weight 40000 lbs.

Triple geared head and tailstock spindle operated by side hand-wheel, extra.

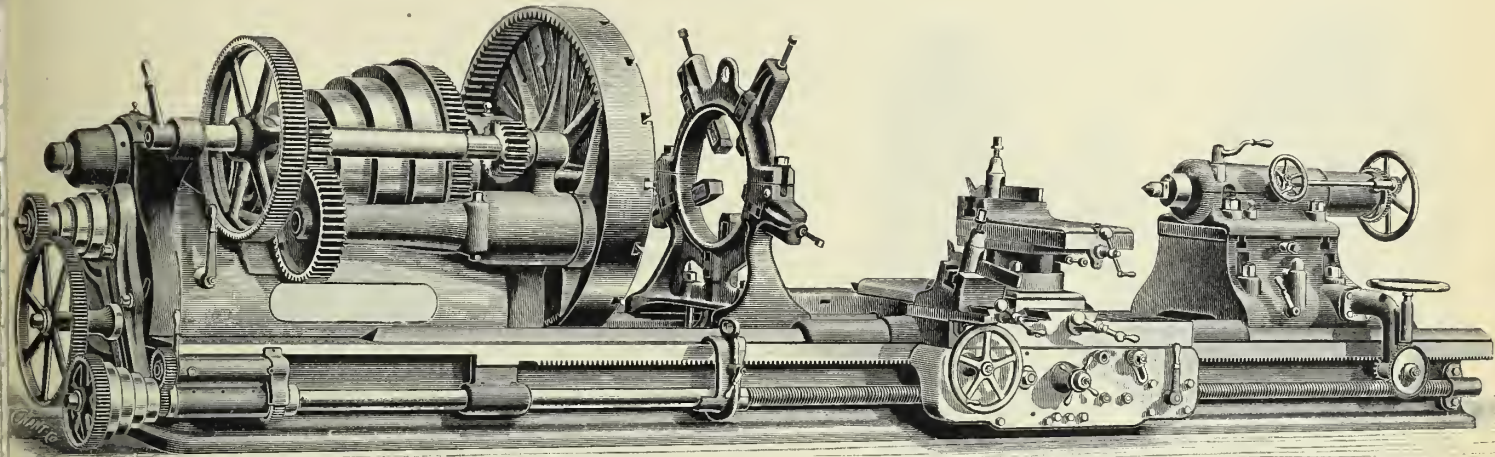
Pulleys on counter, 36 inches diameter, 7 inch face.

Countershaft should make 45 to 50 revolutions per minute.

Reversing speed, 60 revolutions per minute.

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FIG. 64.



EXTRA HEAVY 76 INCH SWING ENGINE LATHE.

SPECIFICATIONS.

Length of Bed.	Swing over Carriage.	Distance between Centers.	Weight. (Screw Cutting.)
25 feet	53 inches.	10 feet	69550
28 "	53 "	13 "	75250
31 "	53 "	16 "	80950
34 "	53 "	19 "	86650
37 "	53 "	22 "	92350
40 "	53 "	25 "	98050
43 "	53 "	28 "	103750
46 "	53 "	31 "	109450
49 "	53 "	34 "	115150
52 "	53 "	37 "	120850
55 "	53 "	40 "	126550
58 "	53 "	43 "	132250
61 "	53 "	46 "	137950
64 "	53 "	49 "	143650
67 "	53 "	52 "	149350
70 "	53 "	55 "	155050

Additional lengths of bed made if required.

Pulleys on counter 40 inches diameter, 9 inches face.

Counter should make 50 revolutions per minute.

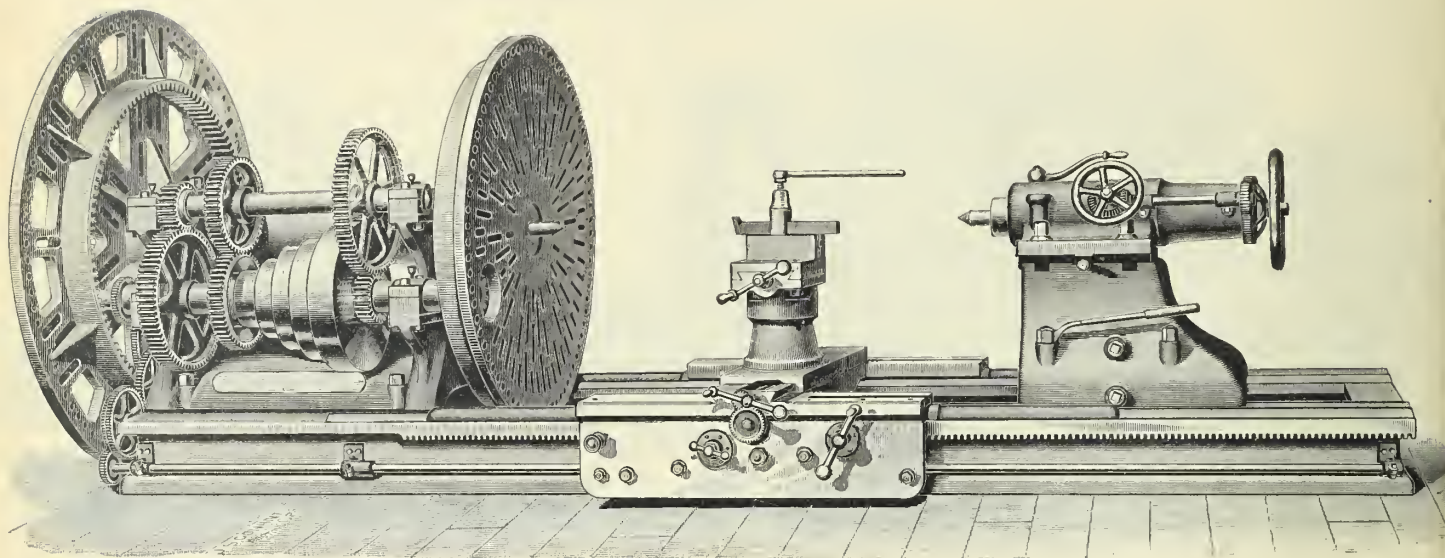
Reversing speed, 60 revolutions per minute.

Range of feed $\frac{1}{8}$ inches to 12 inches for 1 revolution of spindle.

Range of screw cutting, 12 threads to 1 inch to 1 thread in 24 inches.

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FIG. 65.



EXTRA HEAVY TRIPLE GEARED 84 INCH SWING ENGINE LATHE.

WITH BACK FACEPLATE FOR PIT LATHE, EXTRA.

SPECIFICATIONS.

SEVEN FEET SWING ENGINE LATHES.

Geared Face Plates.

Length of Bed.	Swing over Ways.	Swing over Carriage.	Distance between Centers.	Weight.
18 feet	7 feet	59½ inches	8 feet	
22 "	7 "	59½ "	12 "	
32 "	7 "	59½ "	22 "	
42 "	7 "	59½ "	32 "	
52 "	7 "	59½ "	42 "	
62 "	7 "	59½ "	52 "	

Back faceplate for pit lathe, extra.

Tight and loose pulleys on counter, 54 inches diameter, 7 inches face.

Double pulleys (if used), 36 inches diameter, 7 inches face.

Countershaft should make 60 revolutions per minute.

Tailstock spindle, operated by side hand-wheel, extra.

Crank pin boring attachment, extra.

SEVEN FEET SWING ENGINE LATHES.

From New Patterns. Extra Heavy, Strong and Powerful.

Length of Bed.	Swing over Ways.	Swing over Carriage.	Distance between Centers.	Weight.
18 feet	7 feet	59½ inches	8 feet	
22 "	7 "	59½ "	12 "	
32 "	7 "	59½ "	22 "	
42 "	7 "	59½ "	32 "	
52 "	7 "	59½ "	42 "	
62 "	7 "	59½ "	52 "	

Back faceplate for pit lathe extra.

Tight and loose pulleys on counter, 54 inches diameter, 7 inches face.

Countershaft should make 60 revolutions per minute.

Tailstock spindle operated by side hand-wheel, extra.

Crank pin boring attachment, extra.



**EIGHT FEET SWING ENGINE LATHE,
GEARED FACE PLATES.**

SPECIFICATIONS.

Length of Bed.	Swing over Ways.	Swing over Carriage.	Distance between Centers.	Weight.
22 feet.	8 feet.	70 inches.	11 feet.	
32 "	8 "	70 "	21 "	
42 "	8 "	70 "	31 "	
52 "	8 "	70 "	41 "	
62 "	8 "	70 "	51 "	

Tight and loose pulleys on counter, 54 inches diameter, 7 inch face.

Double pulleys (if used), 36 inches diameter, 7 inch face.

Countershaft should make 60 revolutions per minute.

Back face plate for pit lathe and tail-stock spindle operated by side hand-wheel, extra.

EIGHT FEET SWING ENGINE LATHE,

FROM NEW PATTERNS. EXTRA HEAVY, STRONG AND POWERFUL.

SPECIFICATIONS.

Length of Bed.	Swing over Ways.	Swing over Carriage.	Distance between Centers.	Weight.
22 feet.	8 feet.	70 inches.	11 feet.	
32 "	8 "	70 "	21 "	
42 "	8 "	70 "	31 "	
52 "	8 "	70 "	41 "	
62 "	8 "	70 "	51 "	

Tight and loose pulleys on counter, same as above.

Countershaft should make 60 revolutions per minute.

Back face plate for pit lathe and tailstock spindle operated by side hand-wheel, extra.

NINE FEET SWING ENGINE LATHE.

GEARED FACEPLATE.

SPECIFICATIONS.

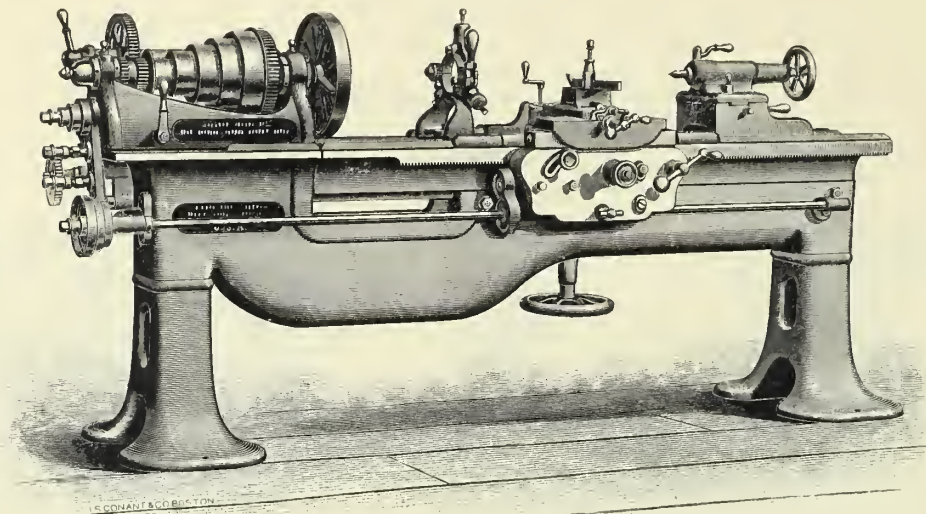
Length of Bed.	Swing over Ways.	Swing over Carriage.	Distance between Centers.	Weight.
27 feet.	9 feet.	80 inches.	15 feet.	
37 "	9 "	80 "	25 "	
47 "	9 "	80 "	35 "	
57 "	9 "	80 "	45 "	
67 "	9 "	80 "	55 "	

Countershaft should make 60 revolutions per minute.

Back faceplate for pit lathe and tailstock spindle operated by side hand-wheel, extra.

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FIG. 66.



STANDARD 16 AND 32½ INCH SWING ENGINE GAP LATHE.

SPECIFICATIONS.

16 AND 32½ INCH SWING ENGINE GAP LATHE.

Gap 18 Inches Long.

Length of Bed.	Swing over Carriage.	Swing through Gap.	Distance between Centers.	Screw Cutting	Weight
6 feet	8¼ ins.	32⅝ ins.	2 ft. 9 ins.	Without	2100
7 "	8¼ "	32⅝ "	3 " 9 "	"	2200
8 "	8¼ "	32⅝ "	4 " 9 "	"	2300
9 "	8¼ "	32⅝ "	5 " 9 "	"	2400
10 "	8¼ "	32⅝ "	6 " 9 "	"	2500
11 "	8¼ "	32⅝ "	7 " 9 "	"	2600
12 "	8¼ "	32⅝ "	8 " 9 "	"	2700
6 "	8¼ "	32⅝ "	2 " 9 "	With	2200
7 "	8¼ "	32⅝ "	3 " 9 "	"	2300
8 "	8¼ "	32⅝ "	4 " 9 "	"	2400
9 "	8¼ "	32⅝ "	5 " 9 "	"	2500
10 "	8¼ "	32⅝ "	6 " 9 "	"	2600
11 "	8¼ "	32⅝ "	7 " 9 "	"	2700
12 "	8¼ "	32⅝ "	8 " 9 "	"	2800

Compound rest furnished when ordered.
 Swing over carriage, 10⅝ inches.
 Range of screw cutting, 1 thread in 2¼ ins. to 36 per in.
 Power cross feed is furnished with offset carriage.
 Pulleys on countershaft are 12 ins. diameter, 4 ins. face.
 Countershaft should make 95 revolutions per minute.
 Reversing speed, 150 revolutions per minute.
 Hollow spindle with 1⅝ inch hole and special 31½ ins. face-plate, extra.

18½ AND 43 INCH SWING ENGINE GAP LATHE.

Gap 20¼ Inches Long.

Length of Bed.	Swing over Carriage.	Swing through Gap.	Distance between Centers.	Screw Cutting.	Weight
8 feet	9 inches	43 inches	4 ft. ½ in.	Without	3280
10 "	9 "	43 "	6 " ½ "	"	3580
12 "	9 "	43 "	8 " ½ "	"	3880
14 "	9 "	43 "	10 " ½ "	"	4180
8 "	9 "	43 "	4 " ½ "	With	3420
10 "	9 "	43 "	6 " ½ "	"	3720
12 "	9 "	43 "	8 " ½ "	"	4020
14 "	9 "	43 "	10 " ½ "	"	4320

Compound rest furnished when ordered.
 Swing over carriage, 12 inches.
 Range of screw cutting, 1 thread in 4½ ins. to 24 per inch.
 Power cross feed is furnished with offset carriage.
 Pulleys on counter, 14 inches diameter, 4½ inches face.
 Countershaft should make 90 revolutions per minute.
 Reversing speed, 100 revolutions per minute.
 Hollow spindle with 1⅝ inch hole and special 42 ins. face-plate, extra.



25 AND 50 INCH SWING GAP CHUCKING LATHE.

DOUBLE GEARED HEADSTOCK.

AN improved and heavy tool of great range and capacity. Cone is balanced and has four shifts for a wide belt. Headstock has patent ground journals with anti-friction metal boxes, which compensate for wear and preserve the original alignment of the live and dead centers.

Spindle boxes are made of one piece of metal (patented); are so constructed as to be susceptible of accurate adjustment; are interchangeable and easily duplicated.

Tailstock is secured to bed by side-screw binder.

Bed slider is operated by rack and pinion, which, when open, give ample swing through gap, and additional distance between centers.

Furnished with countershaft, four-arm faceplate, two pointed centers, one set of improved chucking rests, and wrenches.

Top of bed is hand-scraped to surface plates.

SPECIFICATIONS.

21 AND 37½ INCH SWING GAP CHUCKING LATHE.

Gap 18 Inches Long.

Length of Bed.	Swing over Carriage.	Swing through Gap.	Distance between Centers. (Closed Slide).	Distance between Centers. (Slide Open).	Weight.
6 feet	16 inches.	37½ inches	2 foot 10 inches	5 feet	1850
7 "	16 "	37½ "	3 " 10 "	6 "	1950
8 "	16 "	37½ "	4 " 10 "	7 "	2050
9 "	16 "	37½ "	5 " 10 "	8 "	2250
10 "	16 "	37½ "	6 " 10 "	9 "	2450
11 "	16 "	37½ "	7 " 10 "	10 "	2650
12 "	16 "	37½ "	8 " 10 "	11 "	2850

Tight and loose pulleys on counter, 14 inches diameter, 4 inches face.

20 inches 4 jawed chuck, fitted, extra.

Back geared headstock, extra.

Automatic revolving turret head, extra.

Countershaft should make 80 revolutions per minute.

25 AND 50 INCH SWING GAP CHUCKING LATHE.

Gap 20¾ Inches Long.

Length of Bed.	Swing over Rest.	Swing through Gap.	Distance between Centers. (Closed Slide).	Distance between Centers. (Slide Open).	Weight.
8 feet	20 inches	50 inches	4 foot 4 inches.	7 feet	2950
10 "	20 "	50 "	6 " 4 "	10 "	3250
12 "	20 "	50 "	8 " 4 "	13 "	3500
14 "	20 "	50 "	10 " 4 "	16 "	3800

Tight and loose pulleys on counter, 16 inches diameter, 4½ inches face.

Countershaft should make 75 revolutions per minute.

24 inches 4 jawed chuck, fitted, extra.

Back geared headstock, extra.

Automatic revolving turret head, extra.



28 AND 57 INCH SWING ENGINE GAP LATHE.

WILL FACE UP FULL SWING (THROUGH GAP) WITH AUTOMATIC FEED.

THIS LATHE embodies in its construction the desirable features of the "Putnam Standard" Engine Lathes, and is fitted up with the same care and accuracy.

Driving cone has five shifts for a wide belt. Headstock gears are powerful, speeds are proportioned to give velocities in uniform progression. Live spindle is made from a high grade of crucible steel; is massive. Journals are ground to secure rotundity and accuracy. Spindle boxes are interchangeable and easily duplicated, are made from one piece of anti-friction metal, are susceptible of accurate and easy adjustment, and preserve the original alignment of the live and dead centers.

Tailstock has large spindle, broad base, set-over device, tool shelf and a patent cam-screw binder, which is not equalled for quickness and efficiency; is also fitted with adjustable rolls, which cause the tailstock to slide easily on the bed when its position is changed.

Carriage has an unusual area of wearing surface on the "ways," and is improved by its new construction, giving increased rigidity, and lessens the annoyance from chips, etc.

Feed table is of ample power, and responds quickly to the operator, its action for either cross or lateral feeds being smooth, even and without shock or jar; the feed is operated by both belt and gear, while its range is unequalled, our extra coarse cross and lateral surfacing feed being a new feature.

The bed is remarkably free from distortion by shrinkage incident to improper distribution of metal, and is designed to impart strength and resist vibration, deflection and torsional strains. The "ways" are large, of desirable form, and essentially improved by having the one supporting the front of the carriage larger than the rear one.

This Lathe is furnished with countershaft, large and small faceplates, open adjustable 3 jawed back rest with lever handle lock-nut, and wrenches. Abrasive surfaces are seated by hand scraping, and motive parts (including rack) subject to excessive wear or strain are made of steel.

SPECIFICATIONS.

Length of Bed.	Swing over Carriage.	Swing through Gap.	Distance between Centers.	Screw Cutting.	Weight.
8 feet	14½ inches	57 inches	3 feet 10 ins.	Without	7075
10 "	14½ "	57 "	5 " 10 "	"	7575
12 "	14½ "	57 "	7 " 10 "	"	8075
14 "	14½ "	57 "	9 " 10 "	"	8575
16 "	14½ "	57 "	11 " 10 "	"	9075
18 "	14½ "	57 "	13 " 10 "	"	9575
20 "	14½ "	57 "	15 " 10 "	"	10075
8 "	14½ "	57 "	3 " 10 "	With	7375
10 "	14½ "	57 "	5 " 10 "	"	7875
12 "	14½ "	57 "	7 " 10 "	"	8375
14 "	14½ "	57 "	9 " 10 "	"	8875
16 "	14½ "	57 "	11 " 10 "	"	9375
18 "	14½ "	57 "	13 " 10 "	"	9875
20 "	14½ "	57 "	15 " 10 "	"	10375

Lathe is made in 1 foot lengths of bed. Intermediate lengths, intermediate prices.

Large 52 inch circular faceplate. Weight, 850 lbs., extra.

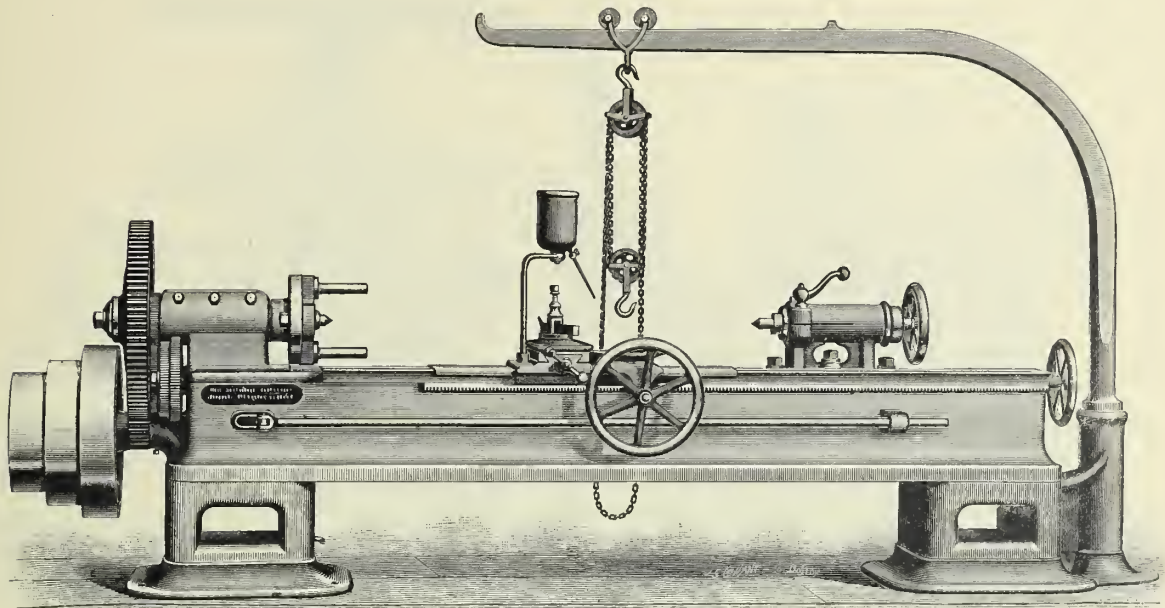
Gap 18 inches long with 8 foot bed, 6 inches longer for each additional foot of bed.

Pulleys on counter, 18 inches diameter, 6 inch face.

Counter should make 60 revolutions per minute. Reversing speed, 70 revolutions per minute.

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FIG. 67.



IMPROVED AXLE-TURNING LATHE.

THIS LATHE is designed particularly for turning car and locomotive axles. Is unequalled in weight, strength, power and convenience. Is provided with a double set of driving pulleys on the countershaft, which enables the operator to rough out and finish work at different speeds without shifting belt on the driving cone.

The head and tail spindles are of cast steel and unusually large; the former is self-oiling, receives the lateral pressure on an anti-friction collar, and is so constructed that the bearings can be compressed to compensate for wear, while the spindle retains a central line.

It has two grades of feeds for roughing and finishing, which can be thrown off or on by the lateral adjustment of shipper rod on the front side of Lathe.

Carriage screw has hand wheel for squaring up the ends and shoulders of axles (a new feature which prevents the carriage from "jumping").

The tailstock is secured to the Lathe bed by three anchor bolts, and can be set to turn straight or tapering; has split binder, also oil cup and spoon for oiling centers.

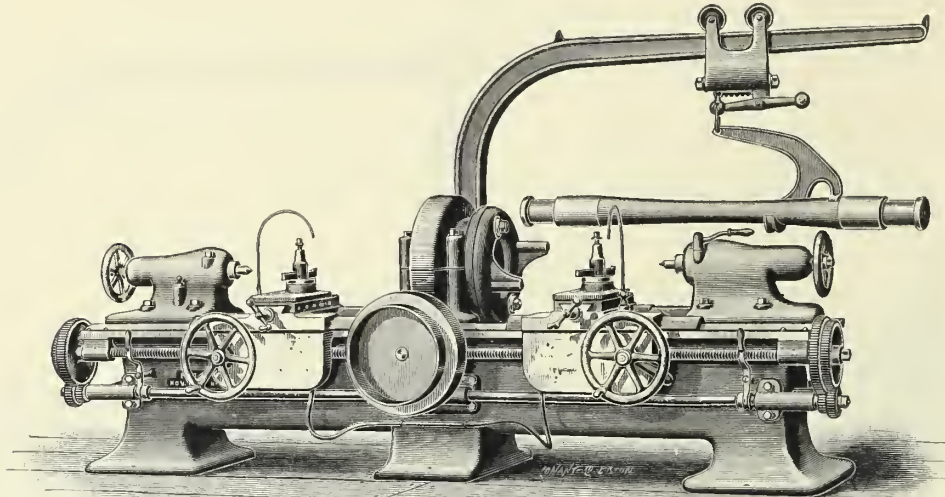
It is furnished with a swinging crane and pulley blocks, by the use of which one man can hoist and adjust the axles to the Lathe centers.

It is also furnished with countershaft, wrenches, and dripper tank with stop cock and standard. Friction pulleys on counter, 24 inches diameter, 7 inch face.

Countershaft should make 60 and 70 revolutions per minute.

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FIG. 68.



DOUBLE AXLE TURNING LATHE.

THIS is a heavy, powerful and rapid machine for turning locomotive and car axles.

The driving head has a ten inch opening through which the axles are passed, revolved on dead centres and finished complete without reversing. Is operated by worm and gear, driven by cone with four inch belt shifts. Is provided with an equalizing or self-centering dog ring. Has double bearings between which the power is applied through the driving gear and worm. This combination gives a steady motion to the axle while under treatment, and produces a smoother cut than is obtained by gearing of other construction.

The Lathe has two independent carriages for finishing both ends of the axle at the same time. Each carriage is complete with tool post, tool ring, water trough, automatic water pipe with stop cock and hand and power feed for both roughing and finishing cuts. Each carriage is fitted to an extra large "way" on front; also to a second "way" nearly under the tool post. This serves to arrest vibration when the cutting tool is under heavy cut.

Carriages are operated (both by hand power) by steel screws. The disengagement of, or change in feed from roughing to finishing is effected by vertical hand levers conveniently located within reach of each carriage.

The Lathe is provided with a large reservoir into which the drip is conveyed after being strained from chips, etc. A rotary pump with a relief valve is employed to force liquid in desirable quantities on to the cut. The Lathe swings 25 $\frac{3}{4}$ inches over bed, 13 inches over carriages and will take in 7 $\frac{1}{2}$ feet between centers.

Each tailstock is provided with four anchor bolts, spindle-screw hand wheel, center oilers, split spindle binders, etc.

A strong and convenient crane with improved double crank hoist and solid axle hook enables the operator to place axles in or remove them from the Lathe.

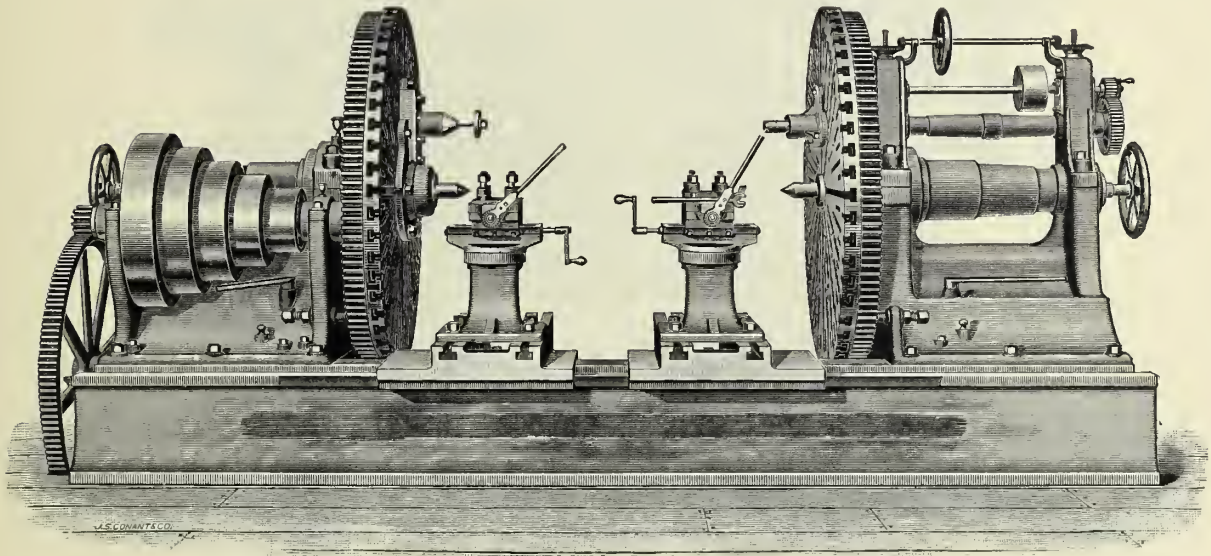
The Lathe is furnished with countershaft complete; also with wrenches and axle dog.

The countershaft is driven by two sets of tight and loose pulleys, 16 inches diameter, 6 inch face, and should make 540 and 640 revolutions per minute.

Weight, 10,500 pounds.

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FIG. 69.



79 INCH SWING DOUBLE HEADED DRIVING WHEEL LATHE,

WITH TEN SPEEDS DRIVEN BY INTERNAL AND EXTERNAL FACEPLATE GEARS.

THIS is a powerful Driving Wheel Lathe throughout, and under the several patents of which we have the sole right to manufacture, carries with it many valuable advantages which cannot be furnished by any other manufacturer without infringement.

Powerfully geared heads, large slotted faceplates, and internal spindles arranged for working independent or simultaneously.

Two patent compound slide rests, with automatic and hand feeds.

Patent quartering attachment, arranged for boring crank-pin holes (30 inch stroke and less), without removing driving wheels from lathes.

Also, patent stop attachment, for locking faceplate.

Crank-pin boring attachment, 9 to 15 inches throw, extra.

Attachment for boring, squaring, and slotting hub or wheel, without removing from Lathe, extra.

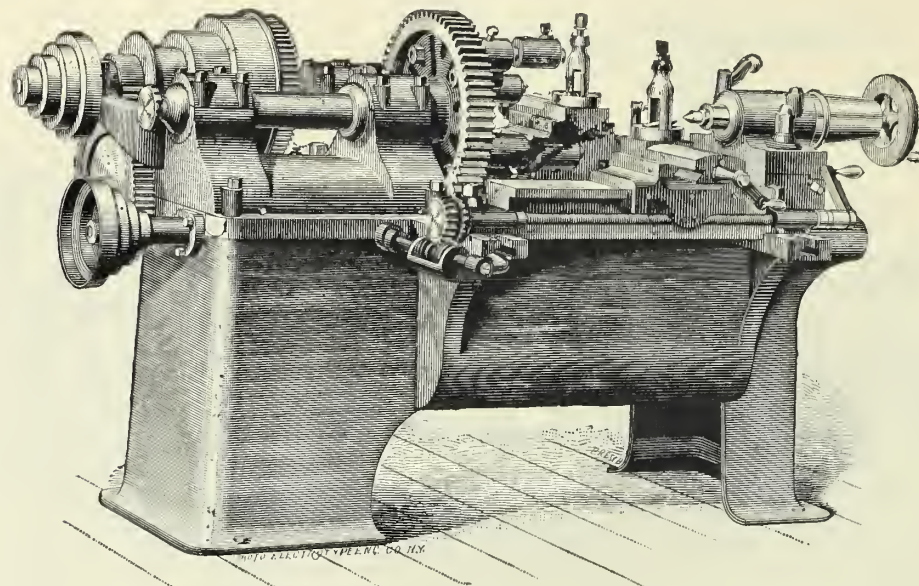
Tight and loose pulleys on counter, 36 inches diameter, 6 inches face.

Countershaft should make 90 revolutions per minute.

Weight, 44500 lbs.

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FIG. 70.



26 INCH PATTERN PULLEY LATHE.

THESE MACHINES are made from entirely new patterns, are strong and powerful, and the bed is designed to gain the greatest stiffness for the weight.

The gearing is cut from the solid, and the driving pinion of face-plate is of Bessemer steel. All machines are triple geared; the feed ranges from one-sixteenth to one-fourth inch cut. Work is turned on centers and driven by arms bolted to face-plate. A boring attachment is supplied, when ordered, by which work strapped to the face plate can be bored by a boring bar passing from the tailstock through the hollow spindle in the headstock.

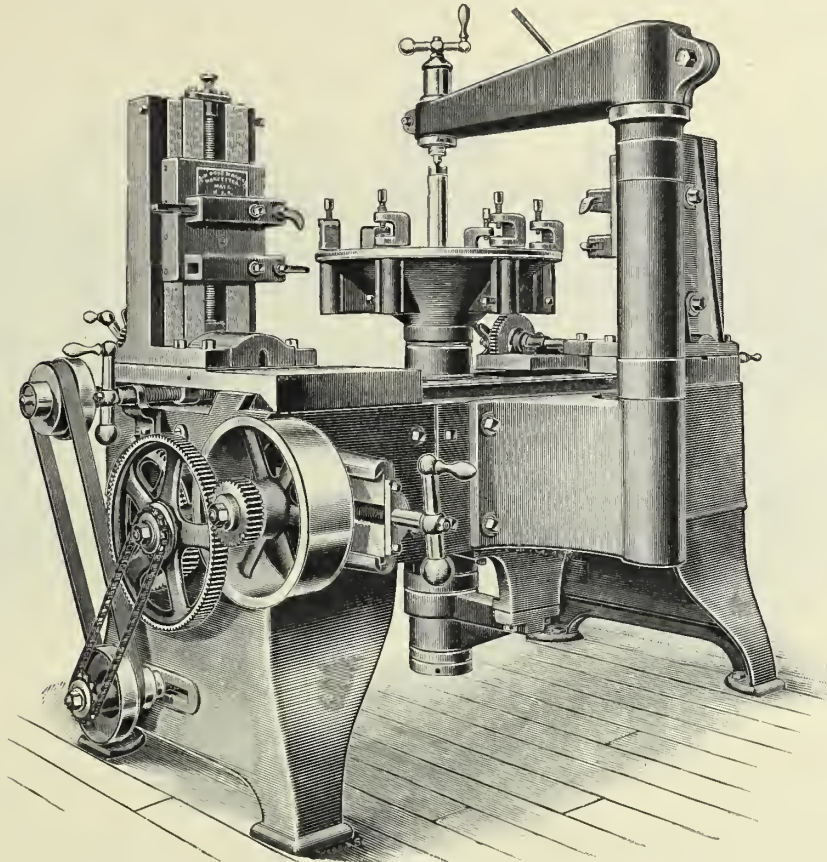
SPECIFICATIONS.

	26 INCH.	36 INCH.
Weight, complete, ready for shipment,	2000 lbs.	3800 lbs.
Floor space required,	6 x 4½	7 x 5½
Diameter of face-plate,	15½ in.	24¼ in.
Speed of counter-shaft,	130	130
Number of changes of speed,	6	8
Diameter of cones,	12, 9½, 7 x 3	14, 12, 10, 8 x 3½
Diameter and face that can be turned,	5 to 26 x 19 in.	10 to 36 x 21 in.
Distance between centers.	28 in.	33 in.

Boring attachments and compound rests are extra.

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FIG. 71.



IMPROVED PATTERN, PULLEY LATHE.

THE above illustration represents the Improved Pulley Turning Lathe for accurate and quickly turning pulleys. This machine has two heads that travel on a horizontal way on the bed, each of which has a tool holder carrying two tools, and can be set to turn either straight or crowning face pulleys.

The pulley to be turned, after being bored, is placed on an arbor fitted in the main spindle in the middle of the bed, and firmly held by the arms near the rim in a horizontal position in an improved chuck easily and quickly adjusted.

Change gears are furnished that enable the machine to cut twenty-four feet per minute irrespective of the diameter of the pulley being turned.

This machine has power vertical feed on both heads, and power cross feed on one head.

All the gearing is turned and cut from the solid, and the workmanship first-class throughout.

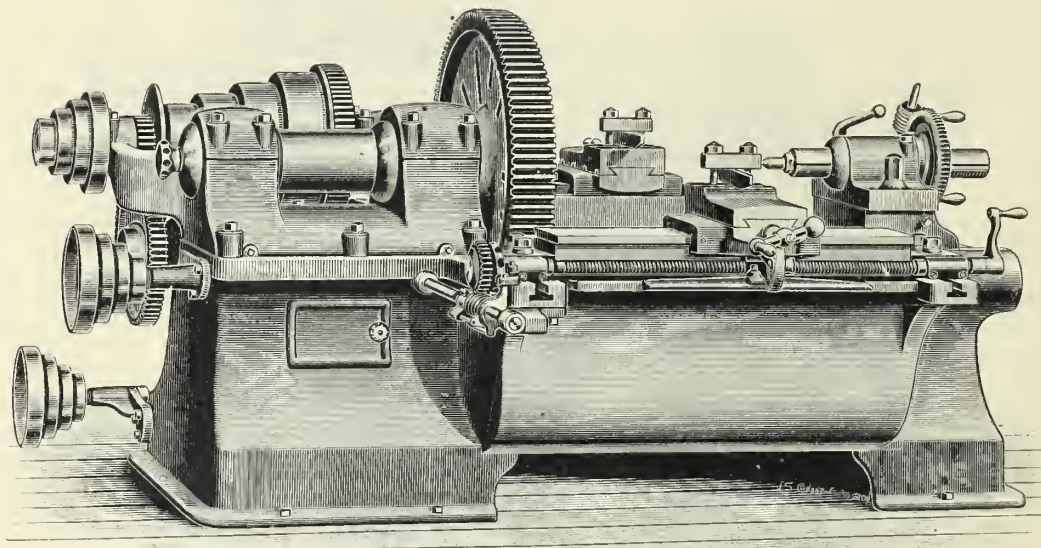
We furnish with each machine four faceplates, or chucks to accommodate the different size pulleys to be turned. One set of change gears. One countershaft complete.

SPECIFICATIONS.

	No. 1.	No. 2.	No. 3.
Weight,	3600 lbs.	3800 lbs.	4300 lbs.
Floor space required,	6 ft. 6 ins. x 4 ft.	7 ft. x 4 ft.	7 ft. 10 ins. x 4 ft.
Number of changes of speed,	13	13	13
Diameter and face that can be turned,	12 ins. to 30 ins. x 14 ins.	12 ins. to 36 ins. x 14 ins.	12 ins. to 40 ins. x 20 ins.
Speed of countershaft,	180	180	180
Size of countershaft pulleys (T. & L.),	14 ins. x 4 ins.	14 ins. x 4 ins.	14 ins. x 4 ins.

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FIG. 72.



50 AND 60 INCH PATTERN PULLEY LATHES.

THESE MACHINES are made from entirely new patterns; are strong and powerful; and the bed is designed to gain the greatest stiffness for the weight. The gearing is cut from the solid, and the driving pinion of face-plate is of Bessemer steel. All machines are triple geared; the feed ranges from one-sixteenth to one-fourth inch cut. Work is turned on centers and driven by arms bolted to face-plate. A boring attachment is supplied, when ordered, by which work strapped to the face-plate can be bored by a boring bar passing from the tailstock through the hollow spindle in the headstock.

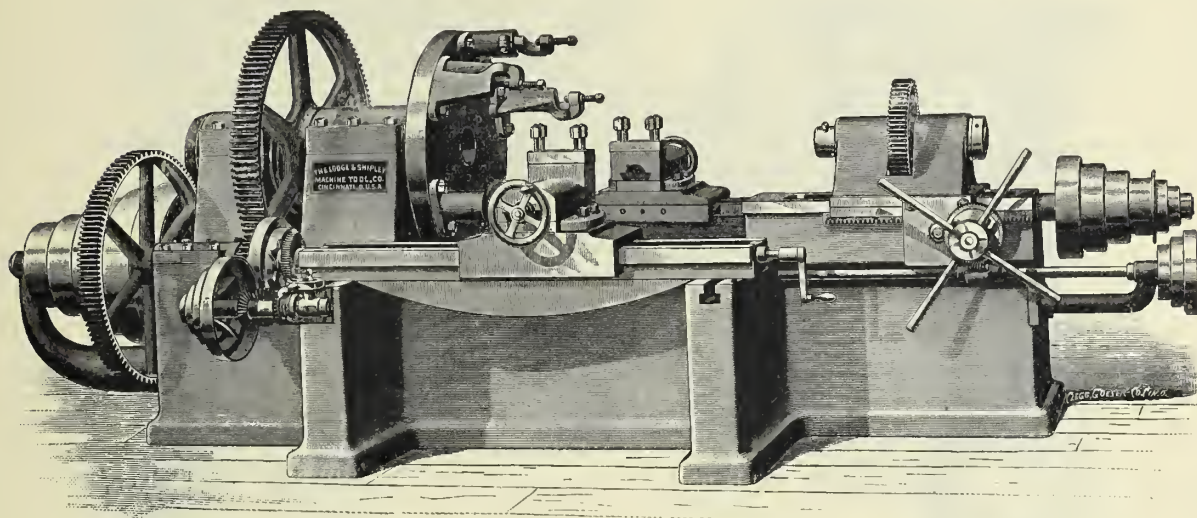
SPECIFICATIONS.

	50 INCH.	60 INCH.
Weight, complete, ready for shipment, -	4500 lbs.	5000 lbs.
Floor space required, - - - - -	8 x 7	8 x 8
Diameter of face-plate, - - - - -	29 in.	29 in.
Speed of countershaft, - - - - -	120	120
Number of changes of speed, - - - - -	8	8
Diameter of cones, - - - - -	14, 12, 10, 8 x 4	14, 12, 10, 8 x 4
Diameter and face that can be turned, - - -	16 to 50 x 30 in.	16 to 60 x 30 in.
Distance between centers, - - - - -	40 in.	40 in.

Boring attachments and compound rests are extras.

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FIG. 73.



60 INCH PULLEY LATHE.

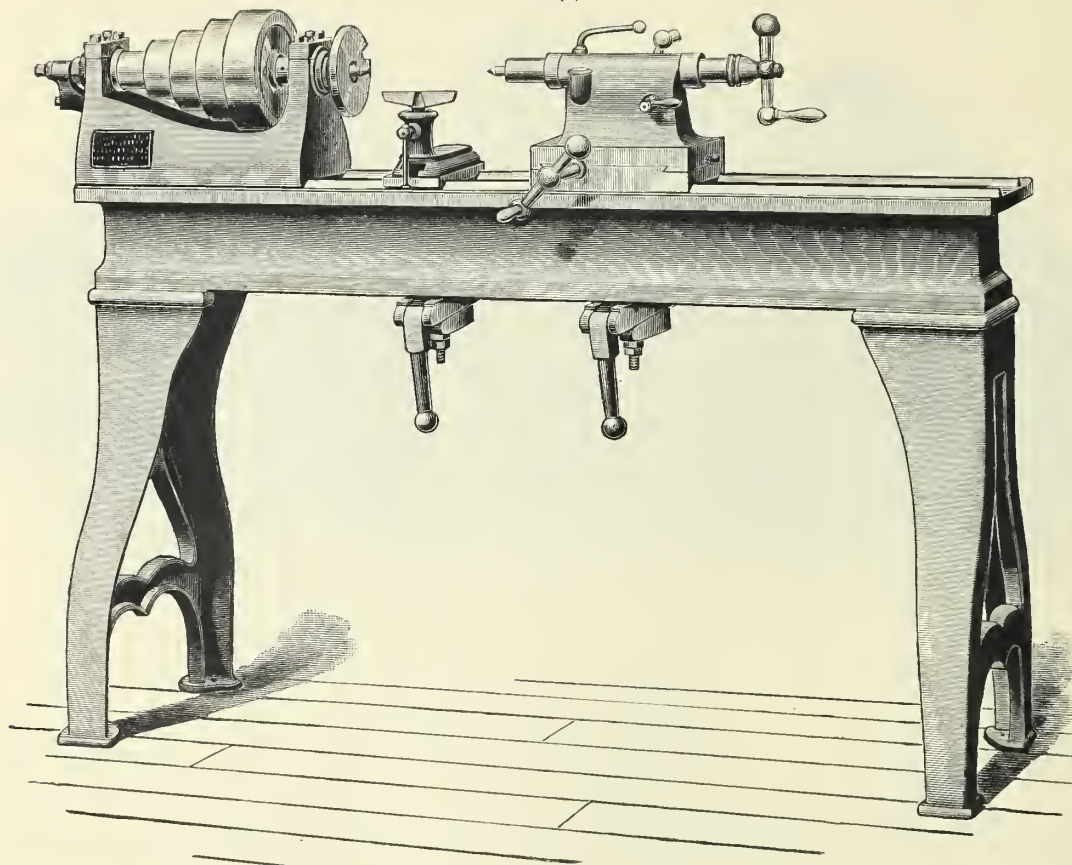
THE 60 inch Pulley Lathe, above illustrated, is designed to turn, square, and bore pulleys from 18 to 60 inches diameter by 36 inches face. The bed, including the wings, is all one casting up to the spindle bearings. The solidity of the bed, together with the large bearing surfaces provided for carriages, insures a rigidity not to be obtained in any other manner. The machine is geared 60 to 1, has cone pulley with six steps for 5 inch belt. Spindle is 10 inches in diameter, and is hollow, having a 6 inch hole through its entire length; nose of spindle, where chuck-plates and chucks screw on, is 14 inches in diameter. The bearings for the spindle are scraped into the head. Rails have sufficient travel to turn a pulley 36 inches face, and there is sufficient space between the head end and tail-stock to receive a pulley of this face. Power cross and angular feeds are provided on back rail. Pulleys may be held for boring and turning simultaneously, or a mandrel may be used for turning.

The boring-bar takes a bearing in a bush in the live spindle, and is provided with a self-oiling device. A proper cutting speed may be obtained with the boring-bar for the different sizes.

Power feed is provided, also hand feed by means of pilot-wheel. The machine may also be furnished with a regular foot-stock and spindle for turning only. Weight, 20000 lbs.

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FIG. 74.



14 INCH SWING SET-OVER, OR HAND FOX LATHE.

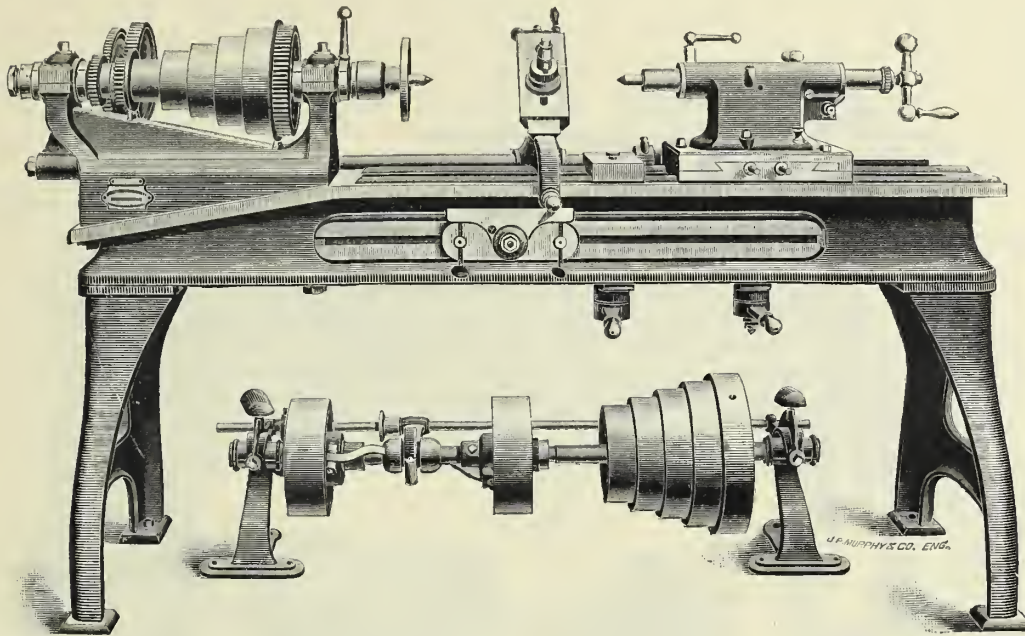
THESE LATHES have 14 inch swing and 5 foot bed. The spindles are of the best hardened steel, and run in phosphor bronze boxes of ample size, and have special provision for resisting the end thrust. The live cone is large, and has five changes of speed for wide belts. The tailstocks have dove-tail set-over and quick return motion to the spindles. A neat table is secured to the back of the Lathe by iron brackets for the reception of finished work. The nose of spindle can be chased to any standard guage.

Hand rest, countershaft, wrenches, etc., are furnished with each Lathe.

Diameter of pulleys,	-	-	-	-	-	6 inches
Speed,	-	-	-	-	-	250 revolutions
Weight,	-	-	-	-	-	850 pounds

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FIG. 75.



No. 1 IMPROVED BRASS FINISHERS' SET-OVER LATHE.

THE above illustration represents an Improved Brass Finishers' Lathe, built from entirely new patterns, and designed for use on brass work of every description. By means of the incline plane, the headstock can almost instantly be raised and lowered, as may be required, to a height to agree with that of the tailstock. This feature is a desirable one, and will be appreciated by all who are aiming to do their work well and rapidly. The live spindle is made of special steel which is very hard and close grained.

The journals are large and run in self-oiling bronze boxes that are fitted with arrangement for adjusting, by which the spindle can be kept to a perfect running fit, and all held so rigidly that shaking is impossible. We have overcome the principal objection to hollow spindle lathes, by providing a thrust bearing that continually runs in oil, and thus the spindle is relieved of the great friction and wear it has heretofore been subjected to.

The taper attachment on the front of the bed will be appreciated by all who have had taper threads to cut with screw apparatus, as the guide bar can be set accurately and quickly.

The tailstock has all the desirable features of the square arbor tailstock, swivel, back motion and dovetail setover.

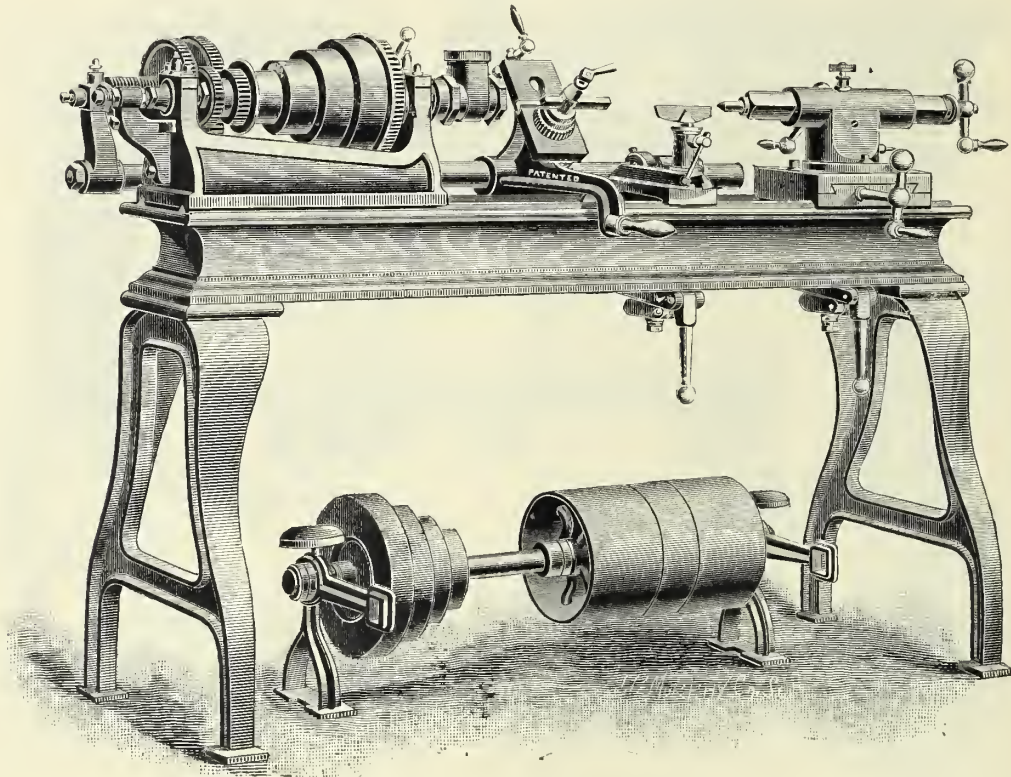
The construction of the spindle more effectually resists a tendency to partially rotate (when boring is to be done with the spindle), than is effected even with a square spindle, and is again superior to that, for when worn enough to produce chattering, it can be adjusted to its original degree of tightness.

SPECIFICATIONS.

Bed 6 feet long; swings 17 inches, hollow spindle. Back geared, with $1\frac{1}{8}$ inch hole; screw apparatus; taper attachment, swivel, back motion, dovetail set-over and overhead works. Cone for $2\frac{1}{4}$ inch belt has 5 changes; countershaft with 10 inch by 3 inch friction pulleys, should make 150 revolutions per minute. Floor space 78 inches by 28 inches. Shipping weight, 1300 pounds.

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FIG. 76.



No. 1 SQUARE ARBOR LATHE.

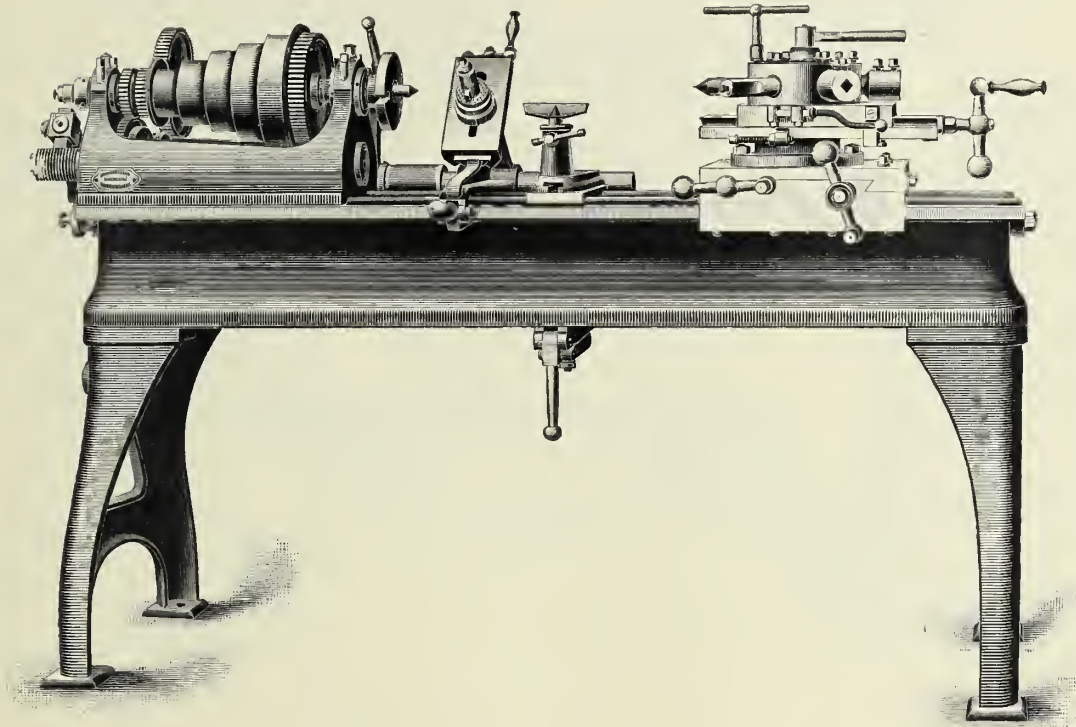
SPECIFICATIONS.

No. 1.—Bed, 6 feet long, swings 15 inches, with dove-tail set over, swivel and back motions, back gears, screw apparatus and overhead works. Cones have four changes for $2\frac{1}{4}$ inch belt. $1\frac{1}{2}$ inch countershaft has 10 inch reverse pulleys, or 10 inch by 3 inch friction pulleys, and should make 180 revolutions per minute. Floor space, 70 inches by 28 inches. Weight, 1,000 pounds. Hardened spindle and boxes, and hobbs for cutting threads, including cutter and leader, are extras. Allowance is made for back gears and screw apparatus when not wanted.

No. 2.—Bed, 5 feet long, swings 13 inches, with screw apparatus and hardened spindle, dove-tail set over, back motion and overhead works. Cones have four changes for 2 inch belt. $1\frac{1}{2}$ inch countershaft has $8 \times 2\frac{1}{2}$ inch reverse pulleys and should make 250 revolutions per minute. Floor space, 5 feet 5 inches by 2 feet. Shipping weight, 675 pounds. Hobbs for cutting threads, including cutter and leader, are extra. Without the screw apparatus the cones would have 5 changes for two inch belt.

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FIG. 77.



No. 1 FOX MONITOR LATHE.

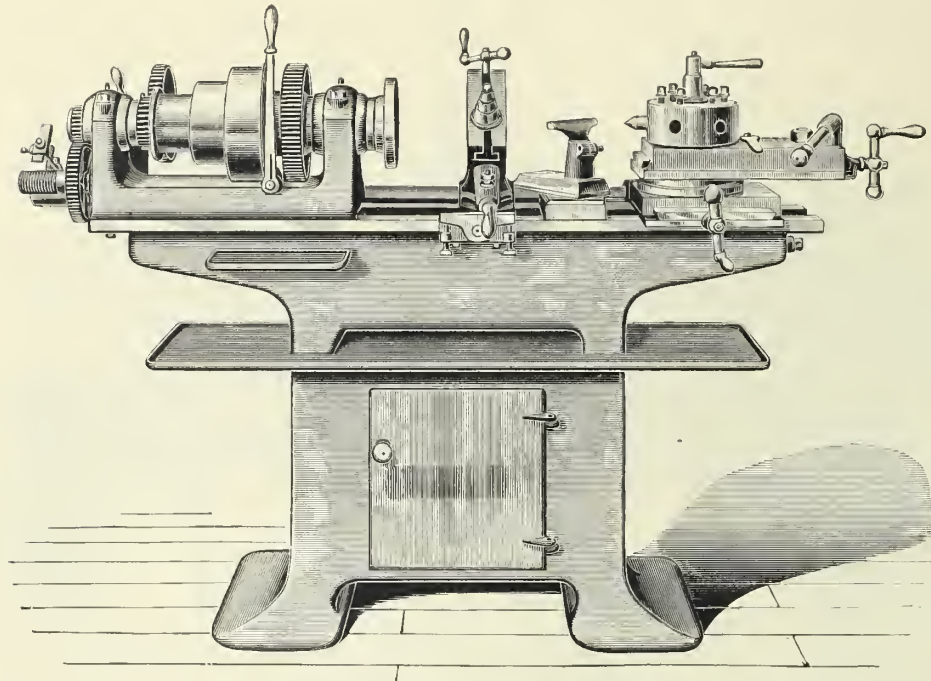
SPECIFICATIONS.

Bed, 6 feet long. Swing, 18 inches, with back gears, chasing bar, and overhead works. Cone for $2\frac{1}{4}$ inch belt has five changes. Countershaft, with 12 inch reverse pulleys, should run 150 revolutions per minute. Floor space 74 inches by 28 inches. Shipping weight, 1600 pounds.

Friction countershaft furnished if desired.

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FIG. 78.



13, 16 AND 18 INCH PATTERN FOX MONITOR LATHES.

THESE LATHES are carefully designed, well built, and easy of operation. The different parts are proportioned to handle work within their range.

The turret slides can be operated by either lever or screw feed, and the swivel can be set at any angle.

The cross motion of turret is towards the front of machine, and an adjustable stop is furnished for returning the turret to a central position.

The chasing bar is furnished with an attachment for cutting taper threads. Each machine is furnished with hand rest, necessary wrenches, face plate, follower, and countershaft.

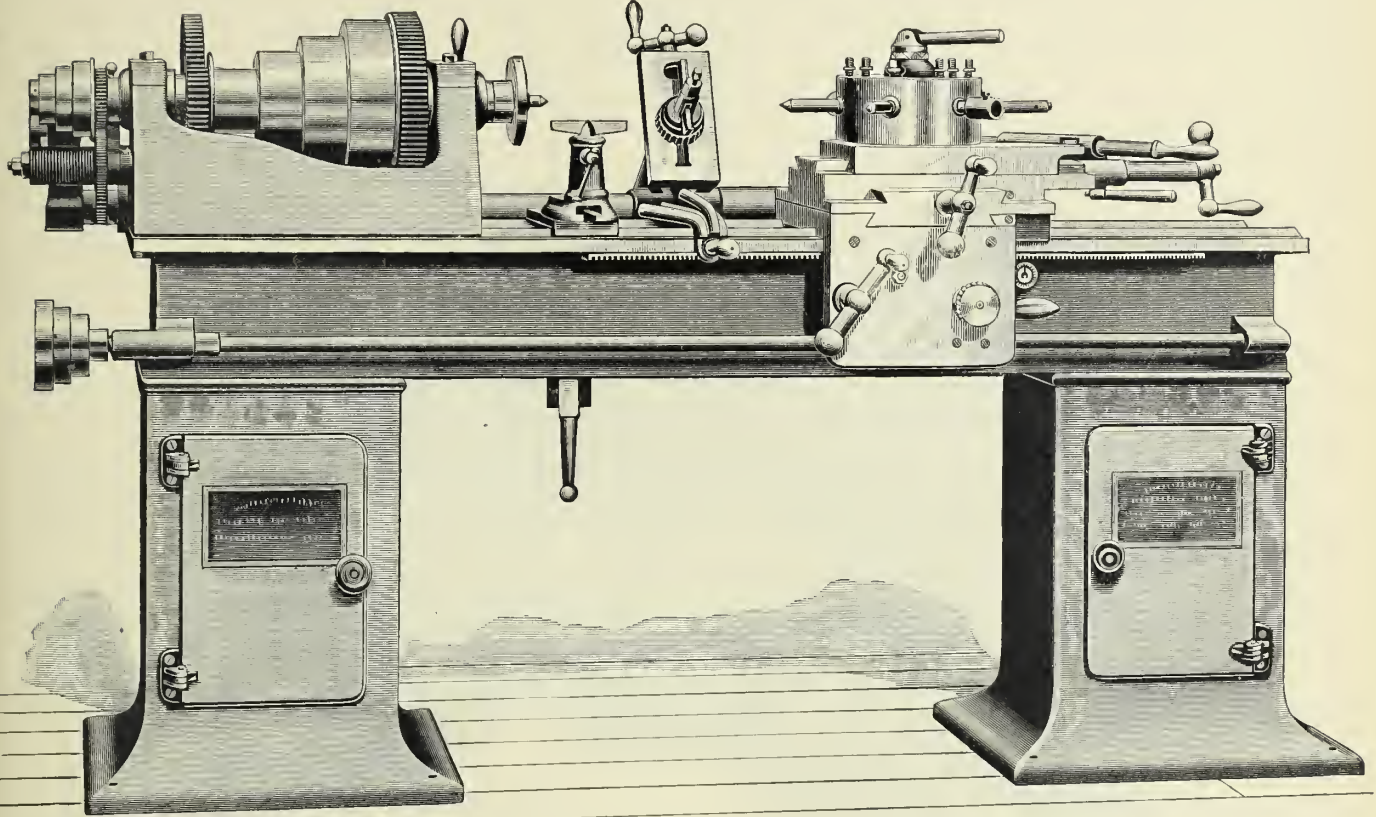
A cut-off or slide rest, when required, can be furnished as an extra.

SPECIFICATIONS.

	3	4	5
Number of machine, - - - - -	3	4	5
Swing over bed, - - - - -	13 inches	16 inches	18 inches
Length of bed, - - - - -	4 feet 4 inches	5 feet	5 feet 7 inches
Weight, - - - - -	1050 pounds	1600 pounds	2000 pounds
Hole through spindle, - - - - -	1 3/4 inches	2 1/4 inches	2 3/4 inches
Diameter of holes in turret, - - - - -	1 inch	1 1/4 inches	1 1/2 inches
Number of holes in turret, - - - - -	6	6	6
Diameter of turret, - - - - -	7 1/2 inches	8 1/2 inches	9 1/2 inches
Actual milling length, - - - - -	6 1/2 inches	10 inches	12 inches
Countershaft pulleys, - - - - -	10 x 3 inches	12 x 4 inches	14 x 4 1/2 inches
Diameter of spindle cone, plain machine, - - - - -	6, 8 1/2, 10 inches	7, 9 1/2, 12 inches	9, 11 1/2, 14 inches
Diameter of spindle cone, clutch back geared, - - - - -	6, 7 1/2, 9 inches	7, 8 3/4, 10 1/2 inches	9, 11, 13 inches
Spindle belt width, plain machine, - - - - -	3 1/2 inches	4 inches	4 1/2 inches
Spindle belt width, clutch back geared, - - - - -	2 1/2 inches	3 inches	4 inches
Spindle journals, large, - - - - -	3 3/16 x 4 inches	3 3/8 x 4 1/2 inches	3 7/8 x 5 inches
Spindle journals, small, - - - - -	2 3/4 x 3 1/2 inches	3 x 4 inches	3 1/2 x 4 1/2 inches

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FIG. 79.



COLUMBIA CO. CHICAGO.

IMPROVED 18 INCH SWING, 6 FOOT BED, CABINET FOX MONITOR LATHE.

THE TURRET is so designed that one slight backward movement of the handle loosens the turret, and at the same time withdraws the locking pin; while a slight forward movement produces the fractional revolution of the turret for the next tool, and at the same time locking and tightening it. This machine will cut left-hand threads with right-hand leaders, thus saving the cost of a separate set of left-hand hobs and leaders.

The cone pulley has four steps of large diameter, and is strongly backgeared.

The spindle is made of high grade steel accurately ground, and has large hole through same.

The journals are of phosphor bronze. The end of spindle has standard thread to receive face plate or chuck, and has taper hole for center, and with center in turret and hand rest accompanying, machine may be used as a hand Lathe.

The thread chasing bar is very rigid, and has substantial bearings bolted to the back of bed.

The front bearing of chasing bar may be moved along the bed by means of tongue and groove to accommodate position of chasing head when operating on work held in chuck, or between centers.

The different pitches of threads are obtained by the well-known follower and leader device. One leader and follower to cut $11\frac{1}{2}$ threads per inch, also one hob to cut follower, go with each machine.

The chasing arm has a tilting handle, by which the operator can back the arm to the under side of bed, and prevents its lifting when in use, but allows it to slide freely endwise. Straight or taper threads may be cut, and the change from one to the other may be made instantly.

The turret is provided with automatic engine feed with three changes, which may be reversed by the handle at the left-hand side of apron, and directly at the hand of the operator. There is also a longitudinal movement by either lever or screw. The top slide rests upon a slide having a right-angle hand movement operated by a screw to front of machine, allowing a large range for facing off work held in chuck. When using this hand set over, the holes in turret can always be brought central with spindle by a positive stop. The stop can be quickly removed when tools are to be used on back side of center of spindle.

The slide has an additional cross movement operated by a supplementary taper slide, taper being derived from a bar between the ways of the bed. The bar can be set by a graduated index, as shown in cut, to obtain any taper from 4 inches to 1 foot. This obviates the necessity of setting over the headstock for taper-boring or turning, and by this new taper attachment work can be faced off square when taper work is completed, without any change. When used for straight work, the taper side is locked to saddle by a taper tool steel pin, having a square head for its ready removal.

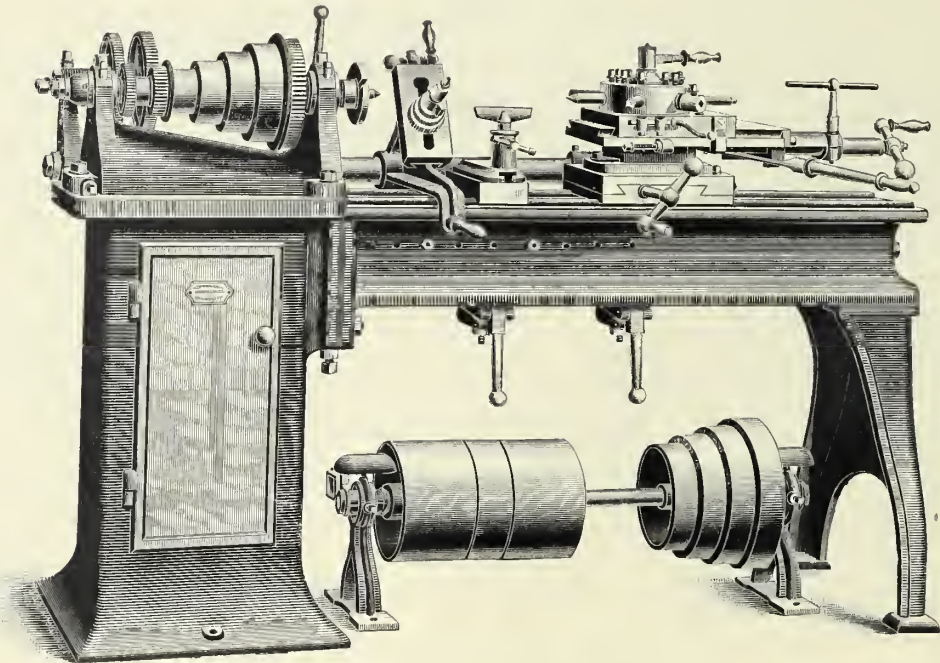
The automatic feed allows pieces of any length to be operated on within the range of the machine. When automatic feed is not used, the saddle may be locked to bed by gib screw at right-hand side of apron.

The following turret tools are a part of and go with each machine: One $\frac{5}{8}$ inch, and the other $\frac{3}{4}$ inch hole, two boring bars and one center. These tools are held in turret by $\frac{3}{4}$ inch diameter hardened tool-steel set screws.

This machine has an unusually large range for brass work, and is fitted up with the best of workmanship and material in all its parts. Countershaft has tight and loose pulleys 10 inches in diameter, $6\frac{1}{2}$ inch face, and should run 225 revolutions per minute.

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FIG. 80.



No. 2 CABINET FOX MONITOR LATHE.

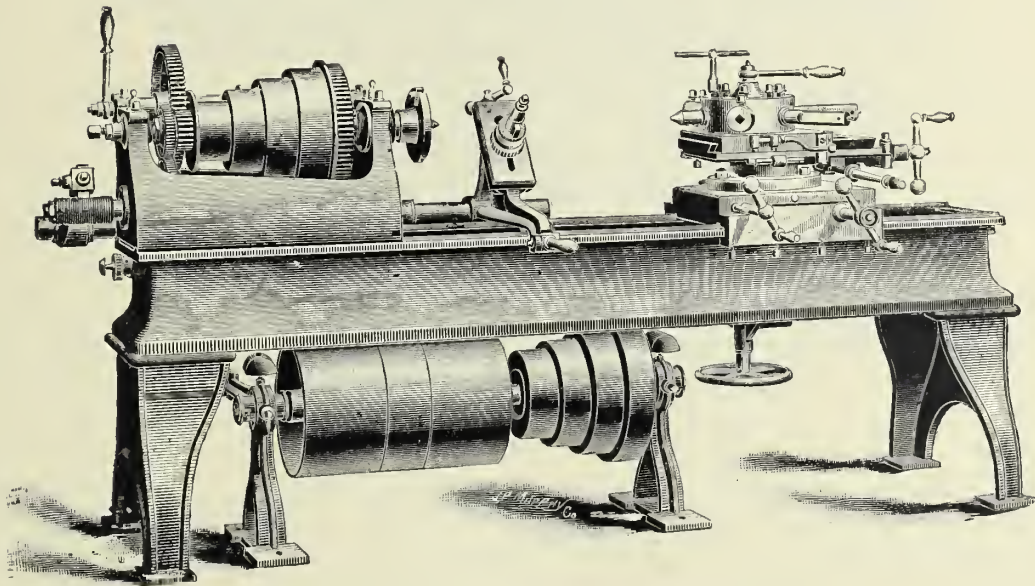
SPECIFICATIONS.

No. 1.—Bed, 7 feet long. Swings 20 inches. Engine feed, back geared, screw apparatus and overhead works. Cone for $2\frac{3}{4}$ inch belt has 4 changes. Countershaft, with 12 inch reverse pulleys, should make 160 revolutions per minute. Floor space, 82 inches by 24 inches. Shipping weight, 2950 pounds.

No. 2.—Bed, 6 feet long. Swings 18 inches. Back geared, screw apparatus and overhead works. Cone for $2\frac{1}{4}$ inch belt has 4 changes. Countershaft, with 10 inch reverse pulleys, should make 180 revolutions per minute. Floor space, 74 inches by 24 inches. Shipping weight, 2000 pounds. Slide rests for the above Lathes are extra.

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FIG. 81.



No. 0 FOX MONITOR LATHE.

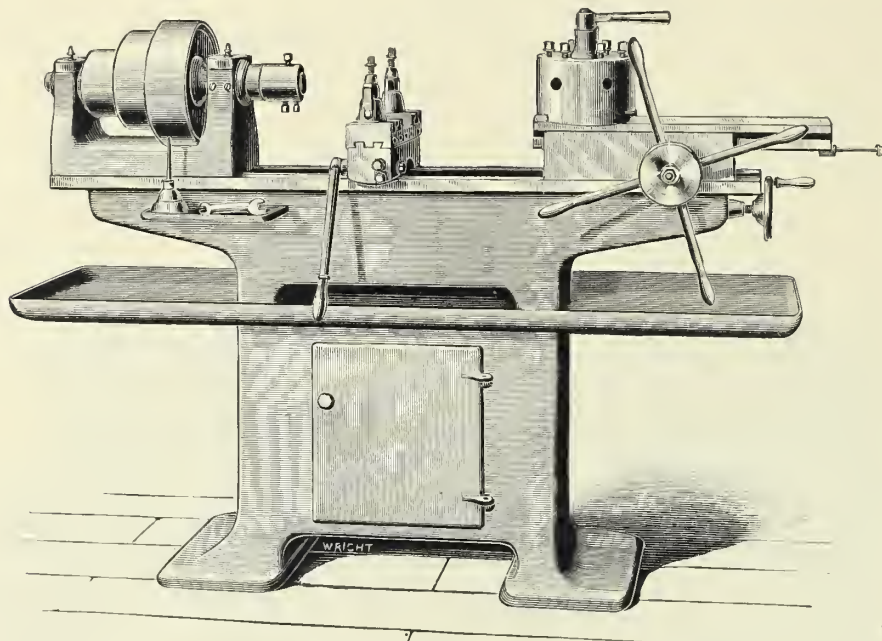
SPECIFICATIONS.

Bed, 8 feet long. Swing, 24 inches, with engine feed, back gears, screw apparatus and overhead works. Cone for 3 inch belt has four changes. Countershaft, with 14 inch reverse pulleys, should make 150 revolutions per minute. Floor space, 120 inches by 36 inches. Shipping weight, 2850 pounds.

Friction countershaft furnished if desired.

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FIG. 82.



No. 4 MONITOR LATHE,

WITH PLAIN HEAD.

ALL of these Monitor Lathes have spindles and bearings of large diameter, with large holes through the spindles. They are equipped, when desired, with power feed to turret, power feed to cross slide, wire feed and chuck.

The sizes are 13, 16, 18 and 21 inch swing with beds of ample length mounted on cabinets with closets for small tools. All the surfaces are scraped and provisions are made to take up wear and alignment in all directions.

The construction is such that there is no tendency to spring or chatter even with the heaviest cuts. The turret slides are long and stiff and are automatic. There is no springing of any of the parts when the lock bolts or gibs are tightened.

Much care has been given to the simplicity of construction throughout, and all the workmanship and materials are first-class. Every screw, bolt and nut, together with wrenches and parts subject to wear or abrasion, are carefully case hardened.

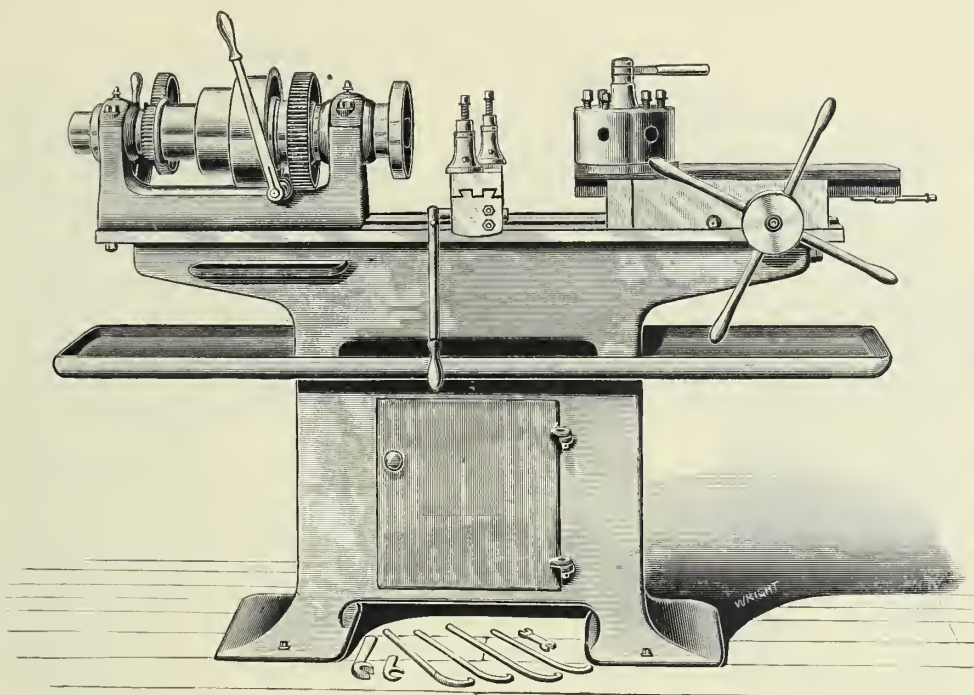
With these machines, work may be bored, reamed, faced off, taped out, threaded, or turned off. A friction countershaft, with forward and back motion, is provided with each machine.

SPECIFICATIONS.

	3	4	5	6
Number of Machine,	-	-	-	-
Swing over bed,	13 inches	16 inches	18 inches	21 inches
Length of bed,	4 feet 4 inches	5 feet	5 feet 7 inches	9 feet 6 inches
Hole through spindles,	1 3/4 inches	2 1/4 inches	2 3/4 inches	3 1/4 inches
Diameter of holes in turret,	1 inch	1 1/4 inches	1 1/2 inches	3 inches
Number of holes in turret,	6	6	6	6
Diameter of turret,	7 1/2 inches	8 1/2 inches	9 1/2 inches	14 inches
Actual milling length,	6 1/2 inches	10 inches	12 inches	14 inches
Countershaft pulleys,	10 x 3 inches	12 x 4 inches	14 x 4 1/2 inches	16 x 5 inches
Speed of countershaft for iron,	90 revolutions	80 revolutions	75 revolutions	70 revolutions
“ “ “ brass,	200 revolutions	190 revolutions	170 revolutions	160 revolutions
Diameter of spindle cone, plain machine,	6, 8 1/2, 10	7, 9 1/2, 12	9, 11 1/2, 14	11, 14, 17
“ “ “ clutch back geared,	6, 7 1/2, 9	7, 8 3/4, 10 1/2	9, 11, 13	11, 13 1/2, 16
Spindle belt width, plain machine,	3 1/2	4	4 1/2	6
“ “ “ clutch back geared,	2 1/2	3	4	5
Spindle journal, large,	3 1/8 x 4	3 3/8 x 4 1/2	3 7/8 x 5	4 3/4 x 8
“ “ small,	2 3/4 x 3 1/2	3 x 4	3 1/2 x 4 1/2	4 1/4 x 7
Weight,	1050 pounds	1600 pounds	2000 pounds	4800 pounds

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FIG. 83.



No. 4 MONITOR LATHE WITH FRICTION BACK GEARED HEAD.

ALL of these Monitor Lathes have spindles and bearings of large diameter, with large holes through the spindles. They are equipped, when desired, with power feed to turret, power feed to cross slide, wire feed and chuck.

The sizes are 13, 16, 18 and 21 inch swing, with beds of ample length mounted on cabinets with closets for small tools. All the surfaces are scraped, and provisions are made to take up wear and alignment in all directions.

The construction is such that there is no tendency to spring or chatter even with the heaviest cuts. The turret slides are long and stiff and are automatic. There is no springing of any of the parts when the lock bolts or gibs are tightened.

Much care has been given to the simplicity of construction throughout, and all the workmanship and materials are first class. Every screw, bolt and nut, together with wrenches and parts subject to wear or abrasion, are carefully case hardened.

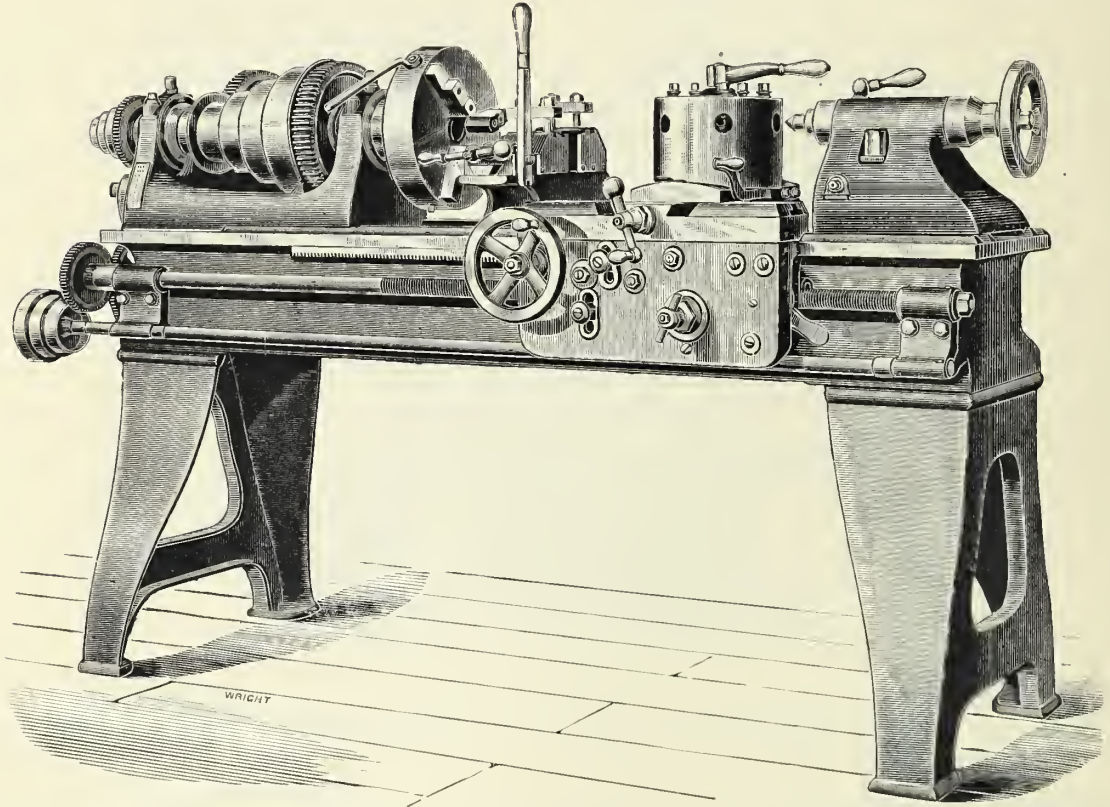
With these machines, work may be bored, reamed, faced off, taped out, threaded, or turned off. A friction countershaft, with forward and back motion, is provided with each machine.

SPECIFICATIONS.

	3	4	5	6
Number of machine,	-	-	-	-
Swing over bed,	13 inches	16 inches	18 inches	21 inches
Length of bed,	4 feet 4 inches	5 feet	5 feet 7 inches	9 feet 6 inches
Hole through spindles,	1 3/4 inches	2 1/4 inches	2 3/4 inches	3 1/4 inches
Diameter of holes in turret,	1 inch	1 1/4 inches	1 1/2 inches	3 inches
Number of holes in turret,	6	6	6	6
Diameter of turret,	7 1/2 inches	8 1/2 inches	9 1/2 inches	14 inches
Actual milling length,	6 1/2 inches	10 inches	12 inches	14 inches
Countershaft pulleys,	10 x 3 inches	12 x 4 inches	14 x 4 1/2 inches	16 x 5 inches
Speed of countershaft for iron,	190 revolutions	175 revolutions	160 revolutions	140 revolutions
Speed of countershaft for brass,	210 revolutions	200 revolutions	190 revolutions	150 revolutions
Diameter of spindle cone, clutch back geared,	6, 7 1/2, 9	7, 8 3/4, 10 1/2	9, 11, 13	11, 13 1/2, 16
Spindle belt width, clutch back geared,	2 1/2	3	4	5
Spindle journal, large,	3 1/8 x 4	3 3/8 x 4 1/2	3 7/8 x 5	4 3/4 x 8
Spindle journal, small,	2 3/4 x 3 1/2	3 x 4	3 1/2 x 4 1/2	4 1/4 x 7
Weight,	1150 pounds	1700 pounds	2100 pounds	4900 pounds

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FIG. 85.



16 INCH ENGINE LATHE WITH CARRIAGE TURRET AND CUTTING OFF, OR FORMING ATTACHMENT.

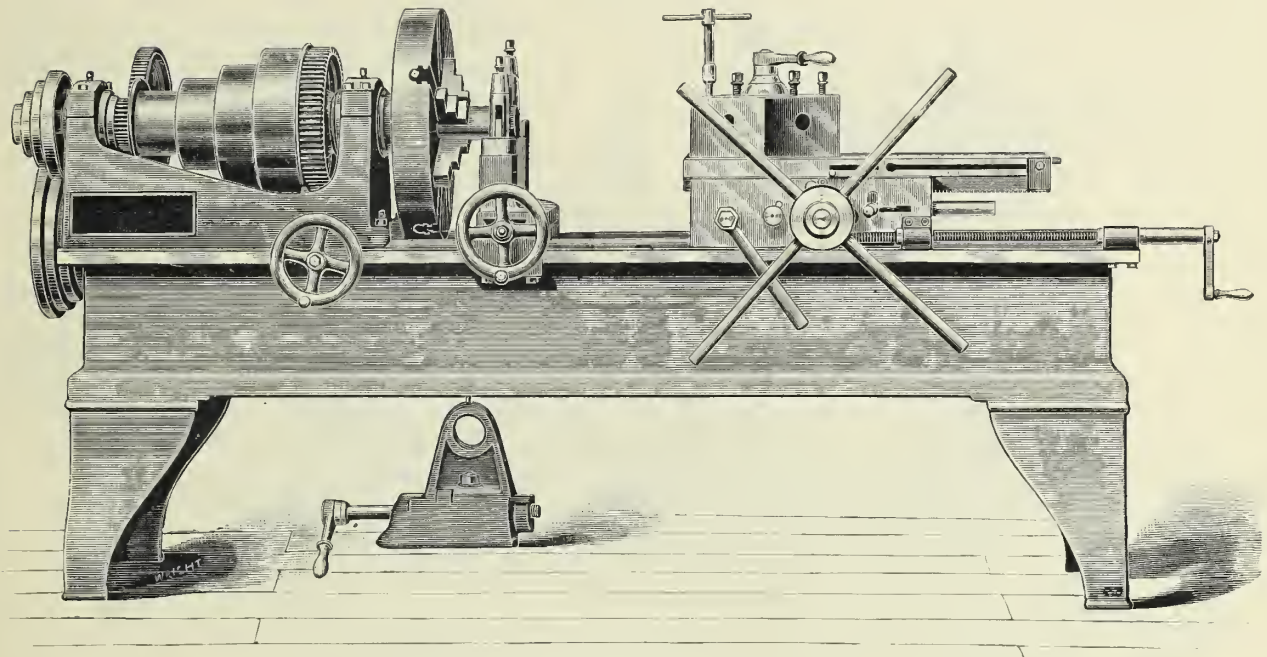
THE above tools combine many features which adapt them to special classes of work. The turret fits on the carriage of the Lathe in place of the tool block, with which it is interchangeable. The turret is fitted so that the same nut for cross feed on tool block is used with the turret when it is desired to face up work, while for the usual class of work done by the turret, a pin is provided for locking to the carriage, in a position always in line with the spindles. A lever at the right operates the locking device. With this we get, in addition to the regular capacity of an Engine Lathe, all the advantages of a first-class turret Lathe, with, possibly, the exception that the turret is not revolved automatically. The turret is 9 inches in diameter, and has six 5-16 inch holes for tools.

Cut-off or Forming Attachment.—We furnish this attachment, when desired, in connection with the turret. The tool blocks are made to take tools $\frac{3}{8}$ inch thick, and for forming up to 4 inches in width, being held in place by bolts and strap. The tool on the back side is used up-side down, bringing the cutting edges of these tools opposite each other. The feed of these tools is so arranged that they are brought up to the centre in unison by means of a right and left hand screw, or, when desired, they can be used singly with the lever. This tool will be found very useful in connection with the turret in forming and cutting pieces from the solid bar.

The Lathe for which the above described tools are designed will be found on page 26.

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FIG. 86.



22 INCH TURRET CHUCKING LATHE.

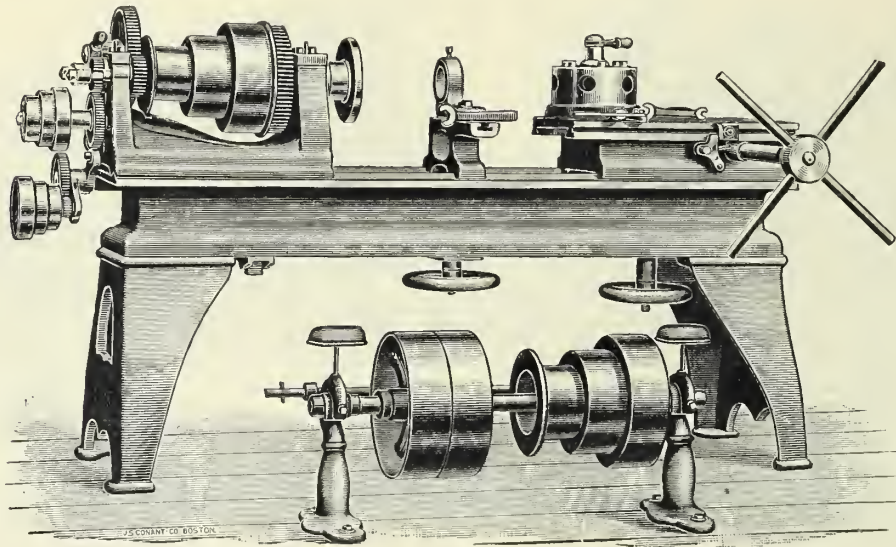
THIS LATHE swings 22 inches, has eight foot bed and is back geared. The extra length of bed permits of the boring out of cone pulleys and similar work. It is driven by a four step cone for a $3\frac{1}{2}$ inch belt; the spindle is bored $2\frac{1}{2}$ inches clear through; the front bearing is $4 \times 5\frac{1}{2}$ inches; the back gearing is $3\frac{1}{2} \times 4$ inches; the bearings are the best phosphor bronze and are protected by dust-proof oil cups; all turrets are hexagonal, 13 inches from side to side, and are provided with tool steel division plates, hardened, with hardened locking key; the turrets revolve automatically, and a lever is provided to withdraw the locking pin by hand, so that the turret may be revolved at any point of its stroke; this avoids having to move the slide back to a given point, and permits of using one or more tools and moving them backward and forward as the nature of the work requires.

The stroke of automatic turret is 24 inches. The stroke when automatic trip is thrown out is 30 inches.

The turret base has a screw movement of 20 inches along the bed. The Lathe is provided with four changes for power feed which is practically powerful and substantial. A pilot wheel is used for hand movement. The double cut-off rest with two tool posts is so constructed that the back rest may be taken off in order to use the full swing of the Lathe; this rest has screw and steel bevel gears so that it may be moved longitudinally 18 inches from nose of spindle. The Lathe also has a guide rest for boring, etc. An 18 inch four-jaw independent chuck, with reversible jaws, is furnished with each Lathe. Weight, 3500 pounds.

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FIG. 87.



22 AND 36 INCH PATTERN TURRET CHUCKING LATHES.

THIS TOOL is designed to handle quickly, work within its capacity, that is to be bored and reamed or, work in which a hole with one or more sizes is to be bored.

It can also be used to a great extent for work similiar to that done on a screw machine.

The machine is made in two sizes and is furnished with or without back gears, as desired. The turret slide is operated by power.

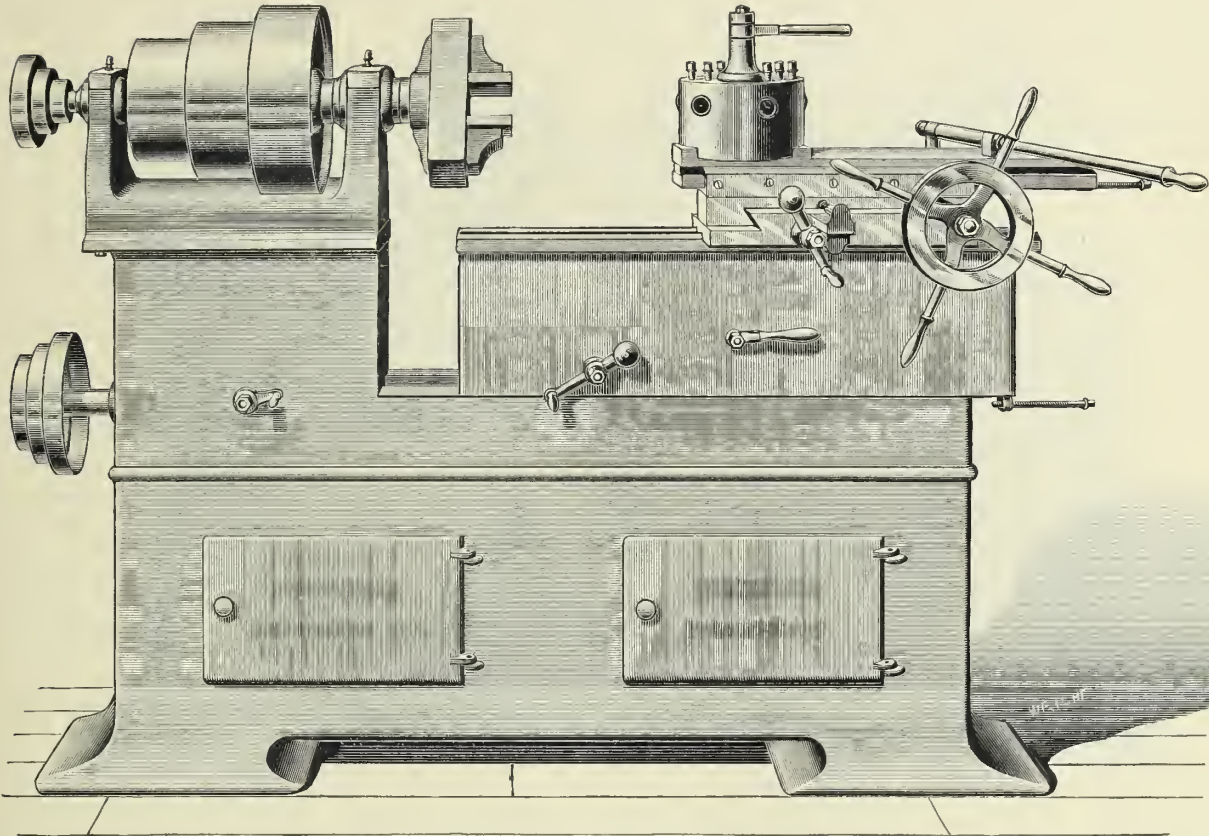
It is carefully made from strictly first-class materials, is well proportioned and will prove a satisfactory investment to parties wanting such a Tool.

SPECIFICATIONS.

	22 Inch	36 Inch
Swing, - - - - -	22 Inch	36 Inch
Hole in spindle, - - - - -	1 $\frac{7}{8}$ inches	1 $\frac{7}{8}$ inches
Diameter of turret, - - - - -	10 inches	10 inches
Diameter of holes in turret, - - - - -	1 $\frac{3}{4}$ inches	1 $\frac{3}{4}$ inches
Number of holes in turret, - - - - -	6	6
Traverse of turret slide, - - - - -	24 inches	16 inches
Diameter of countershaft pulleys, - - - - -	15 inches	15 inches
Face of countershaft pulleys, - - - - -	4 inches	4 inches
Speed of countershaft pulleys, - - - - -	125 revolutions	125 revolutions
Weight complete, - - - - -	2200	3200

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FIG. 88.



No. 4 CHUCKING LATHE, WITH PLAIN HEAD.

WE furnish these Lathes with either plain head, geared head, or friction back geared head. The head stock is extra heavy having large cones for wide belts.

They have power feed to turret both ways, with stop motion. The turret has lateral and cross feed, and either lever or screw lateral feed or pilot wheel and lever arrangement as shown in cut. The design is of neat appearance, and that portion carrying the head stock and lower part of the bed and cabinet are all in one piece.

For convenience in running out of the way, the moveable portion of the bed forming a gap can be run back by means of the handle band and returned to the original position at any time, the stop providing an accurate gauge for the purpose, the lever locking the movable portion of the bed proper, and a similar lever reverses both the cross and lateral feed to turret.

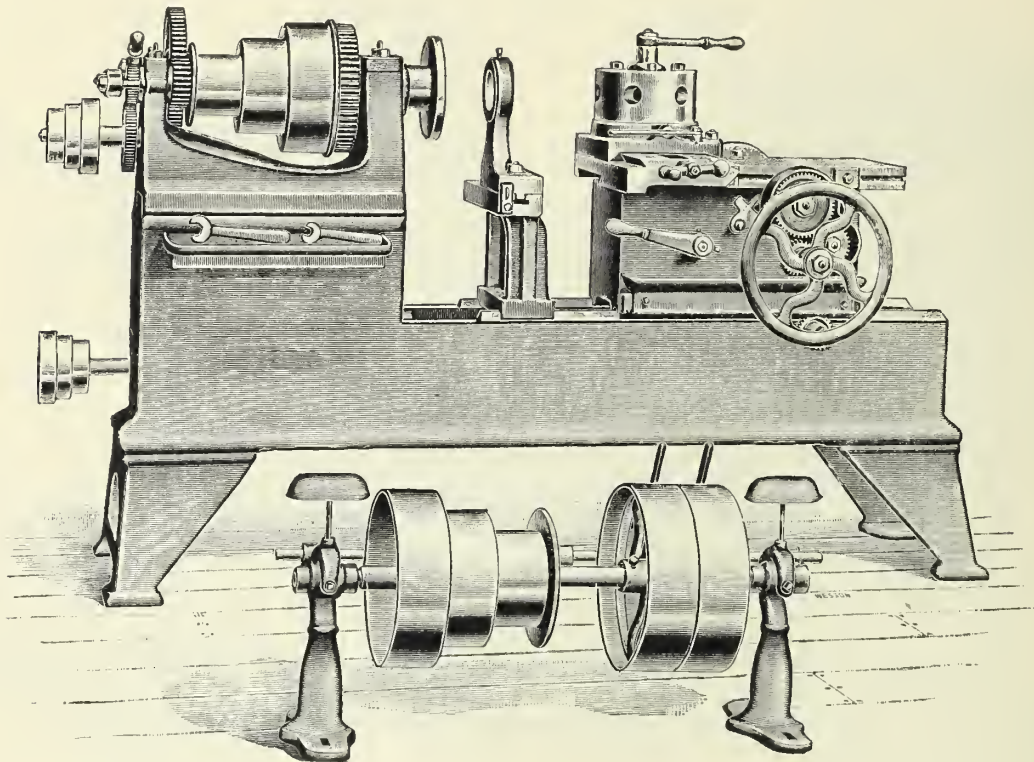
In this form of machine no cross slide is necessary, all the working operations being performed from the turret direct.

SPECIFICATIONS.

Number of machine, -	4	5	6
Swing over bed, -	24 inches	36 inches	48 inches
Length of bed, -	5 feet 4 inches	5 feet 7 inches	9 feet 6 inches
Weight, -	1600 pounds	2000 pounds	4800 pounds
Hole through spindles, -	2 1/4 inches	2 3/4 inches	3 1/4 inches
Diameter of holes in turret, -	1 1/4 inches	1 1/2 inches	3 inches
Number of holes in turret, -	6	6	6
Diameter of turret, -	8 1/2 inches	9 1/2 inches	14 inches
Actual milling length, -	10 inches	12 inches	14 inches
Countershaft pulleys, -	12 x 4 inches	14 x 4 1/2 inches	16 x 5 inches
Diameter of spindle cone, plain machine, -	7, 9 1/2, 12 inches	9, 11 1/2, 14 inches	11, 14, 17 inches
Diameter of spindle cone, clutch back geared, -	7, 8 1/4, 10 1/2 inches	9, 11, 13 inches	11, 13 1/2, 16 inches
Spindle belt width, plain machine, -	4 1/2 inches	4 1/2 inches	6 inches
Spindle belt width, clutch back geared, -	3 1/2 inches	4 inches	5 inches
Spindle journal, large, -	3 3/8 x 4 1/2 inches	3 3/8 x 5 inches	4 3/4 x 8 inches
Spindle journal, small, -	3 x 3 1/2 inches	3 1/2 x 4 1/2 inches	4 1/4 x 7 inches

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FIG 89.



26, 40 AND 50 INCH PATTERN TURRET CHUCKING LATHE, WITH CROSS FACING ATTACHMENT.

THESE LATHES, made in 3 sizes, are designed to handle quickly work within their capacity that is to be bored and reamed, or work in which a hole with one or more sizes is to be bored. They are also furnished with a cross facing attachment, operated by hand or power, which will face to 16 inches diameter; when required this attachment can be arranged to face to full swing of the Lathe. Turret slide is operated by power.

These Lathes can also be used to a great extent for work similar to that done on a screw machine.

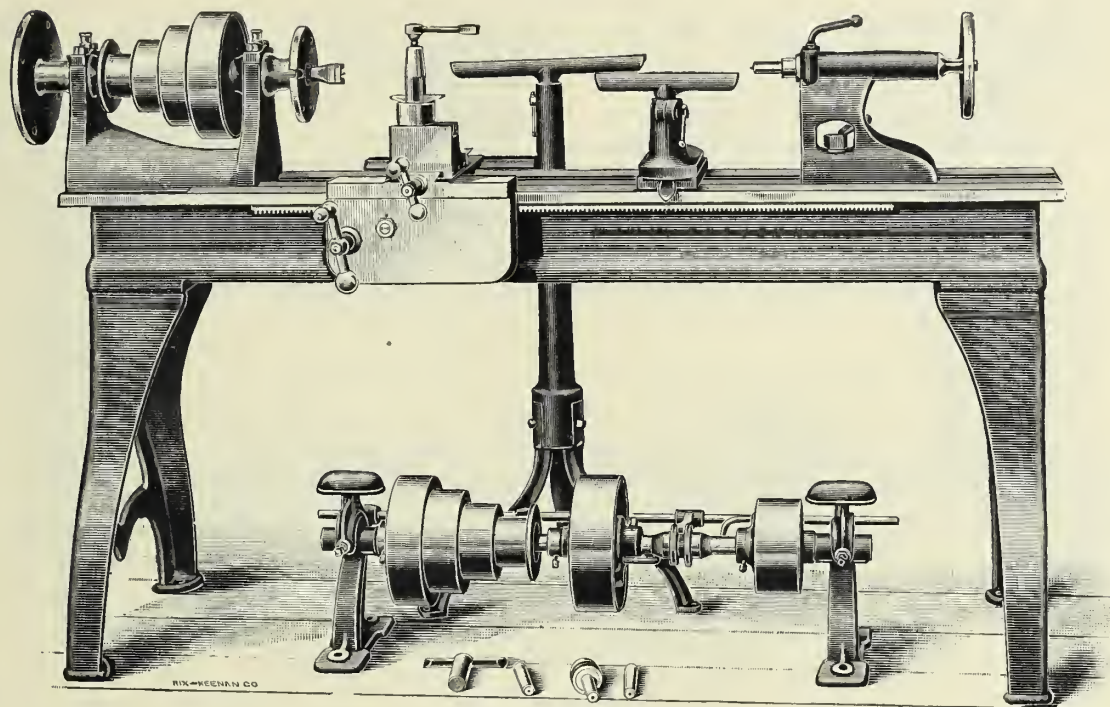
They are carefully made from strictly first-class materials, are well proportioned, and will prove a satisfactory investment to parties wanting such a tool.

SPECIFICATIONS.

Swing, - - - - -	26 inches	40 inches	50 inches
Hole in spindle, - - - - -	1 $\frac{7}{8}$ inches	1 $\frac{7}{8}$ inches	1 $\frac{3}{4}$ inches
Diameter of turret, - - - - -	10 inches	10 inches	14 inches
Diameter of holes in turret, - - - - -	1 $\frac{3}{4}$ inches	1 $\frac{3}{4}$ inches	2 inches
Traverse of turret slide, - - - - -	20 inches	16 inches	20 inches
Traverse of cross facing slide, - - - - -	18 inches	18 inches	30 inches
Diameter of countershaft pulleys, - - - - -	15 inches	15 inches	18 inches
Face of countershaft pulleys, - - - - -	4 inches	4 inches	4 $\frac{1}{2}$ inches
Speed of countershaft pulleys, - - - - -	125 rev.	125 rev.	100 rev.
Weight, complete, about - - - - -	2500 pounds	4000 pounds	5000 pounds

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FIG. 90.



16 INCH SWING PATTERN MAKERS' LATHE.

THIS LATHE has crucible steel spindles. Diameter of bearings, $1\frac{1}{8}$ inches. Length of bearings, $3\frac{5}{8}$ inches. Large face plate on outer end of spindle. Diameter of largest section of cone, $9\frac{1}{2}$ inches. Diameter of smallest section of cone, $3\frac{1}{2}$ inches. Width of belt, $2\frac{1}{4}$ inches. $\frac{3}{4}$ inch hole through spindle, Morse taper. Length of head spindle, $20\frac{7}{8}$ inches. Diameter of tail spindle, $1\frac{7}{8}$ inches. Length of tail spindle, $8\frac{3}{4}$ inches.

It is furnished with two sets of tight and loose pulleys, giving eight changes of speed. One set pulleys, 7 inches in diameter, 3 inch face, should make 460 revolutions per minute. Another set of pulleys, 10 inches in diameter, $3\frac{1}{2}$ inch face, should make 90 revolutions per minute.

We furnish this Lathe with or without carriage and compound rest, and with or without back gears or carriage.

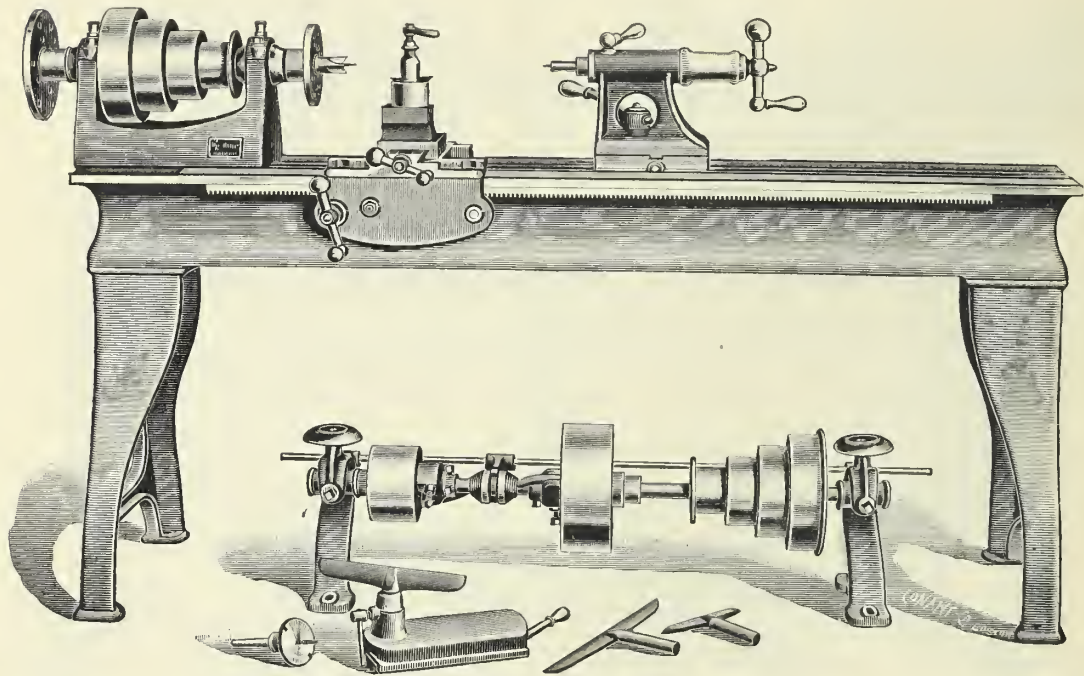
Included are three T rests for hand turning, one rest for chucking, and male and female centers. Tripod rest when ordered. Beds of any length desired can be furnished.

SPECIFICATIONS.

Swings over bed,	-	-	-	-	16 inches	Swings over T rest,	-	-	-	-	$13\frac{1}{2}$ inches
Length of bed,	-	-	-	-	6 feet	Swings over carriage slide rest,	-	-	-	-	$12\frac{3}{4}$ inches
Turns,	-	-	-	-	42 inches	Weight,	-	-	-	-	—

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FIG. 90.



16 INCH SWING, HOLLOW SPINDLE, PATTERN-MAKERS' LATHE, WITH CARRIAGE SLIDE REST.

THIS LATHE is designed to meet all the usual requirements of a first-class pattern shop in the way of a wood-turning Lathe. The live spindle extends through outer end of headstock and is provided with a large face plate on that end for turning pulley patterns, or any work larger than the swing of the Lathe. We furnish this Lathe with or without the carriage as shown in cut. We also, when desired, put a compound rest on this carriage or furnish the Lathe with power feed.

The bed is made rigid by being cast with tie wards, the same as modern engine Lathe beds. The spindles and screw in tail spindle are of steel, the bearings on head spindle being ground, and the boxes (which are of hard cast iron) carefully scraped. The cone (which is bored inside to secure perfect balance), has four changes of speed for $2\frac{1}{4}$ inch belt. The rest holder sets on a plate fitted to the ways, and is readily and securely fastened with a cam lever at the back, within easy reach of the operator. We furnish with each machine a countershaft, with iron cone, two friction pulleys, etc., all complete; also three rests for hand turning, face plates, set of centers, and screw or rosette center.

SPECIFICATIONS.

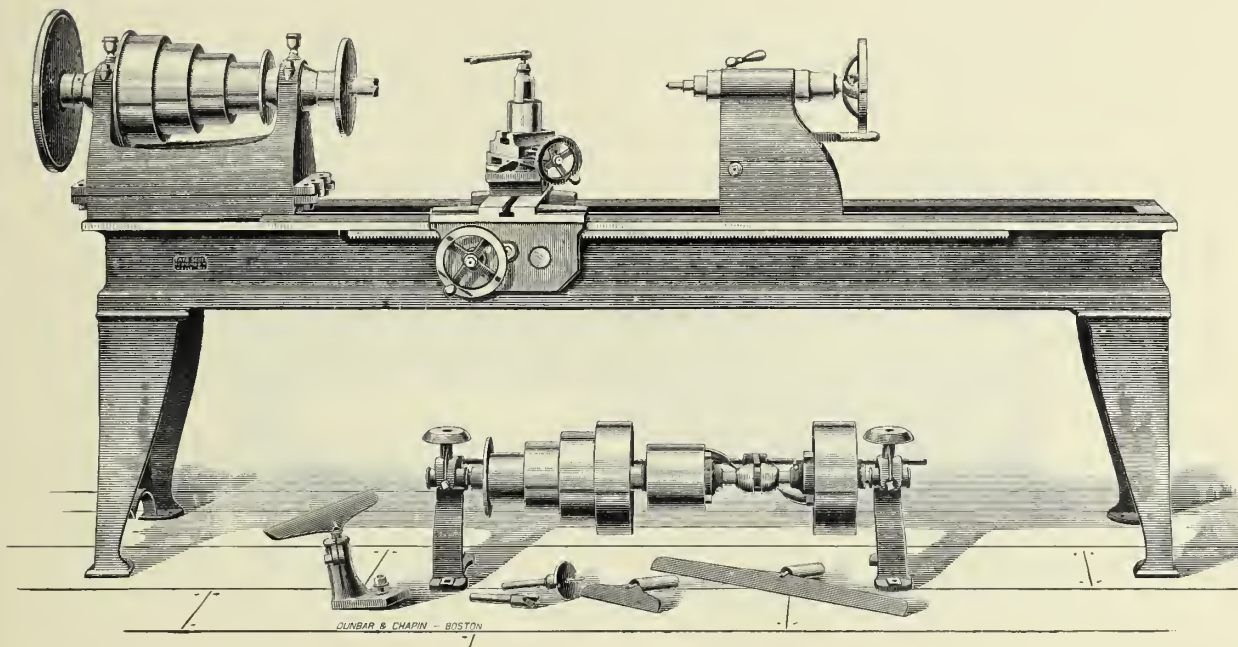
Swing over bed, 16 inches. Swing over carriage, 13 inches. Distance between centers with 6-foot bed, 3 feet 10 inches. Bearings on head spindle, $1\frac{1}{8} \times 3\frac{3}{4}$ inches. Hole through head spindle, 9-16.

Friction pulleys on countershaft, $\left\{ \begin{array}{l} 6 \text{ inch diameter, } \times 3\frac{1}{2} \text{ inch face, } 700 \text{ revolutions.} \\ 10 \text{ inch diameter, } \times 3\frac{1}{2} \text{ inch face, } 85 \text{ revolutions.} \end{array} \right.$

Weight on 6 foot bed, ready for shipment, 700 pounds. Beds of any length desired can be furnished.

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FIG. 91.



24 INCH SWING, HOLLOW SPINDLE, PATTERN-MAKERS' LATHE, WITH CARRIAGE SLIDE REST.

THIS LATHE, which is designed to meet all the requirements of a first-class pattern shop in the way of a wood turning Lathe, has a swivel headstock for convenience in turning draft on patterns chucked on face plate. The head spindle is extended through outer box and has a face plate on end for large work above 24 inches diameter.

The carriage has a hand feed (by rack and pinion) the entire length of bed, and carries a compound slide rest on tool block.

The tail spindle sets over to turn taper (on work between centers) in connection with the carriage. Rests for hand turning are provided as shown. Also a three-legged rest for use in connection with outer face plate. The cone has four changes of speed for 3 inch belt, and the countershaft has two friction pulleys of different size, giving in connection with the cone eight changes of speed, four quite slow for work on outer face plate and four higher speed for lighter work.

SPECIFICATIONS.

Swing over bed, 24 inches. Swing over carriage, 20 inches. Distance between centers with 8 foot bed, 5 feet 2 inches. We furnish beds of any length.

Bearings on head spindle $2\frac{1}{8}$ by $3\frac{3}{4}$ inches. Hole through head spindle, 13-16.

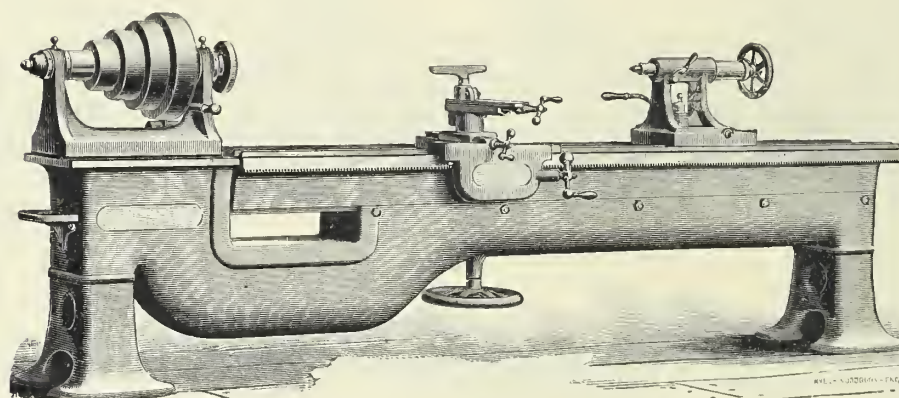
Friction pulleys on countershaft, $\left\{ \begin{array}{l} 6 \text{ inch, } 550 \text{ revolutions.} \\ 10 \text{ inch, } 85 \text{ revolutions.} \end{array} \right.$

Weight on 8 foot bed, ready for shipment, 1300 pounds.

Beds of any length desired can be furnished.

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FIG. 92



PUTNAM STANDARD 25 AND 50 INCH SWING PATTERN MAKERS' LATHE.

AN improved tool for the pattern room, combining great strength, rigidity, and sufficient weight to overcome vibration. The cone is balanced, and has five shifts for wide belt. The headstock has friction brake to overcome momentum of cone; also, patent ground journals, with anti-friction metal boxes, which compensate for wear and preserve the original alignment of the live and dead centers.

The spindle boxes are made of one piece of metal, and are so constructed as to be susceptible of accurate adjustment; are interchangeable and easily duplicated. The rear journal, step and collar run in an oil reservoir, and are automatically lubricated.

The tailstock is secured to the bed by patent cam-screw binder; has set-over bolts for dead spindle; latter is locked by compression lever.

The feed table is operated by diagonal worm, which imparts a smooth and easy motion to carriage, causing it to move rapidly with each revolution of balance handle.

The carriage is gibbed to bed, and has double cross sides and graduated swivel for working outside and inside bevels, tapers, etc.

The bed slider is operated by rack and pinion.

This Lathe is furnished with countershaft, two worm face-plates, two spur centers, two pointed centers, three T rests, screw tool poppet, wrenches; also, an extension arm (with screw), which receives the slide rest with swivel base, and allows bevels, etc., to be turned, and work faced up at the full capacity without change of tool.



PATTERN-MAKERS' LATHE, 21 AND 37½ INCH SWING.

GAP, 18 INCHES LONG.

SPECIFICATIONS. No. 1.

Length of Bed.	Swing over Carriage.	Swing through Gap.	Distance between Centers. (Closed Slide).	Distance between Centers. (Slide Open).	Weight.
6 feet	16 inches	37½ inches	2 feet 10 ins.	5 feet	1825
7 "	16 "	37½ "	3 " 10 "	6 "	1925
8 "	16 "	37½ "	4 " 10 "	7 "	2025
9 "	16 "	37½ "	5 " 10 "	8 "	2225
10 "	16 "	37½ "	6 " 10 "	9 "	2425
11 "	16 "	37½ "	7 " 10 "	10 "	2625
12 "	16 "	37½ "	8 " 10 "	11 "	2825

Tight and loose pulleys on counter, 8 inches diameter, 4 inch face.

Countershaft should make 500 revolutions per minute.

Lathe constructed with overhanging (outside) faceplate and standard rest, extra ; without standard rest, extra.

Lathe constructed with automatic and hand feed to carriage, extra.

PATTERN-MAKERS' LATHE, 25 AND 50 INCH SWING.

GAP, 20¾ INCHES LONG.

SPECIFICATIONS. No. 2.

Length of Bed.	Swing over Carriage.	Swing through Gap.	Distance between Centers. (Closed Slide).	Distance between Centers. (Slide Open).	Weight.
8 feet	20 inches	50 inches	4 feet 4 ins.	7 feet	2800
10 "	20 "	50 "	6 " 4 "	10 "	3050
12 "	20 "	50 "	8 " 4 "	13 "	3300
14 "	20 "	50 "	10 " 4 "	16 "	3550

Tight and loose pulleys on counter, 10 inches diameter, 4½ inch face.

Countershaft should make 550 revolutions per minute.

Lathe constructed with overhanging (outside) faceplate and standard rest, extra ; without standard rest, extra.

Lathe constructed with automatic and hand feed to carriage, extra.

PATTERN-MAKERS' LATHE, 25 AND 50 INCH SWING.

GAP, 20¾ INCHES LONG.

Constructed with *Large Special Headstock* and overhanging (outside) faceplate.

SPECIFICATIONS. No. 3.

Length of Bed.	Swing over Carriage.	Swing through Gap.	Distance between Centers. (Closed Slide).	Distance between Centers. (Slide Open).	Weight.
8 feet	20 inches	50 inches	4 feet 4 ins.	7 feet	2950
10 "	20 "	50 "	6 " 4 "	10 "	3200
12 "	20 "	50 "	8 " 4 "	13 "	3450
14 "	20 "	50 "	10 " 4 "	16 "	3700

Friction pulleys on counter, 12 inches diameter, 6 inch face.

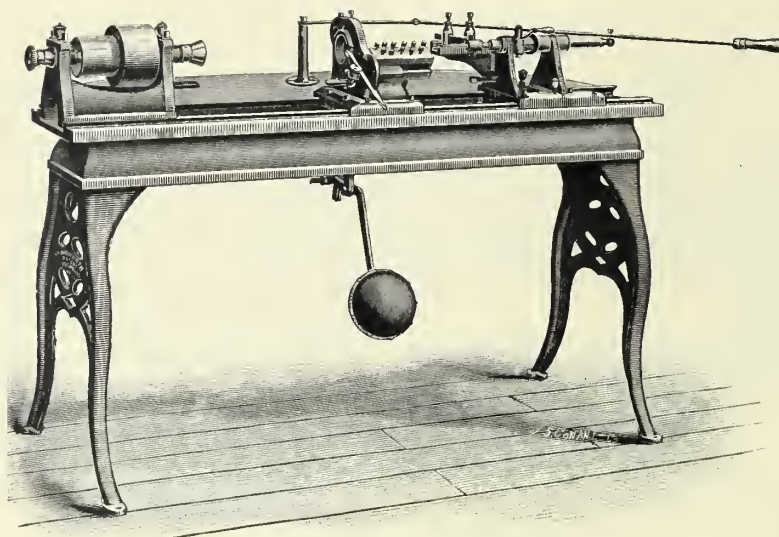
Countershaft should make 250 and 500 revolutions per minute.

Standard rest, extra.

Lathe constructed with automatic and hand feed to carriage, extra.

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FIG. 93.



VARIETY WOOD TURNING LATHE.

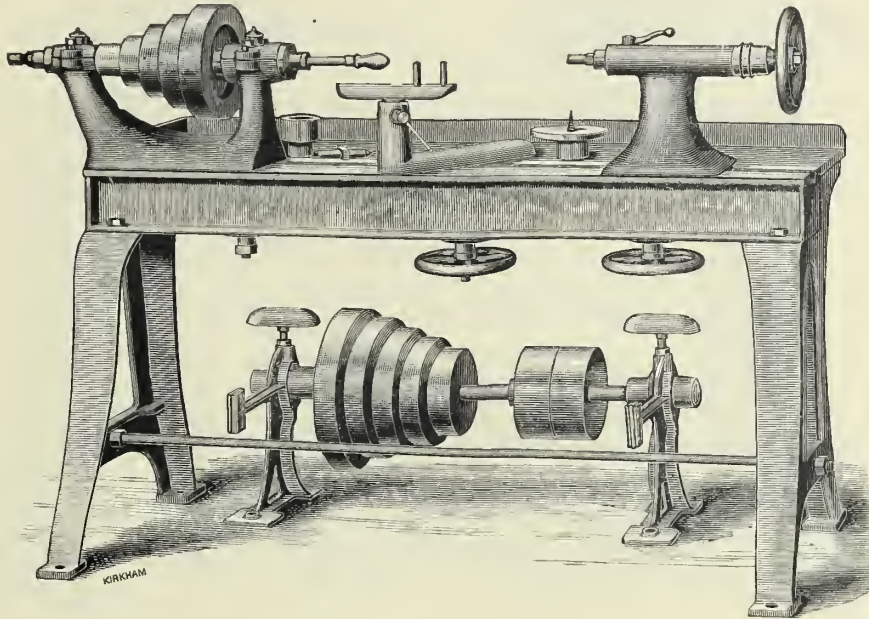
THIS LATHE is acknowledged by all to be the most perfect and rapid Wood Turning Lathe manufactured for every description of small wood turning, such as draw pulls, knobs, rosettes, wood casters, organ stops and rods, scythe snath handles, spinning tops, rolling pins, druggists' boxes, hubs and spokes for baby carriages and carts, thread spools, wood balls, button moulds, pipe bowls and stems, rake teeth, wood toys of every description, short spindles for chairs and furniture, ornaments of all kinds, skewers, bushings for bobbins, handles of all kinds, telegraph and telephone pins, wood faucets, hat-rack pins, croquet mallets and stakes, feather-duster handles, bungs, bit-brace handles and knobs, tent buttons, children's tea sets, etc.

We furnish these Lathes in four sizes. Countershaft furnished with each Lathe. Also one ring, three chucks, and knives for turning one article.

No. 1,	5 feet 9 inch bed,	works stock up to 2 inches diameter.	Weight, 650 pounds
" 2,	" " " " " "	" 2 1/2 " " "	" 650 "
" 3,	6 feet 6 inch " " " "	" 3 1/4 " " "	" 700 "
" 4,	" " " " " "	" 3 1/2 " " "	" 750 "

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FIG. 94.



15 INCH METAL SPINNING LATHE.

THESE LATHES have steel spindles, running in long, self-oiling, babbitted bearings, with the caps planed in and provided with back-pressure screws, thus dispensing with packing, and enabling a perfect adjustment to be easily made.

The rear end of spindle bears against a block provided with means for feeding oil to its center. Most lathes lack this feature, and therefore give trouble, as the oil works away from the center of the spindle while the latter is in motion, causing it to heat and stick.

The cones are made of well-seasoned cherry, in preference to metal, to save weight, thus enabling them to be started and stopped quickly. Wood also gives a better grip to the belt.

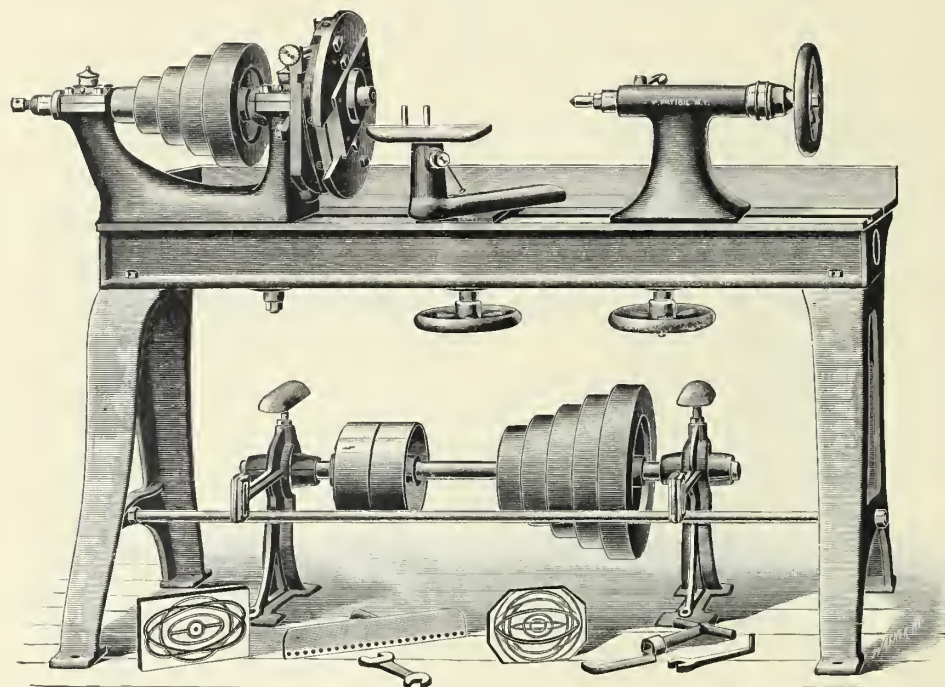
A nipple and center-screw for holding work, a rest bank, a T rest, two centers, one face-plate and one hollow chuck, are furnished with each of these Lathes, also a complete countershaft with self-oiling bearings and self-oiling pulleys. With Lathes over 15 inches swing, two T rests are furnished.

SPECIFICATIONS.

Swing,	-	-	-	12 in.	15 in.	18 in.	22 in.	27 in.
Distance between centers,	-	-	-	30 "	24 "	28 "	26 "	24 "
Length of bed,	-	-	-	54 "	54 "	62 "	64 "	75 "
Diameter of tight and loose pulleys,	7 "	7 "	7 "	7 "	7 "	7 "	8 "	9 "
Belt for tight and loose pulleys,	2 "	2 "	2 "	2 1/2 "	2 1/2 "	2 1/2 "	3 "	3 1/2 "
Turns of countershaft, about	-	-	-	500	550	550	575	650

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FIG. 95.



18 INCH OVAL SPINNING LATHE.

THESE LATHES have steel spindles running in long self-oiling babbitted bearings, with the caps planed in and provided with back pressure screws, thus dispensing with packing and enabling a perfect adjustment to be easily made.

The rear end of spindle bears against a block provided with means for feeding oil to its center. The cones are made of well seasoned cherry, in preference to metal, to save weight, thus enabling them to be started and stopped quickly. A nipple and center screw for holding work, a rest bank, T rest, two centers, one faceplate and one hollow chuck, also countershaft with self-oiling bearings and pulleys, are also furnished.

These Lathes are provided with an attachment which can be readily removed when round work is to be made.

They can be set to turn anything from a round up to an oval with a difference between lengths and width as follows : 18 inch swing, any oval up to 6 inches difference ; 22 inch swing, any oval up to 8 inches difference.

SPECIFICATIONS.

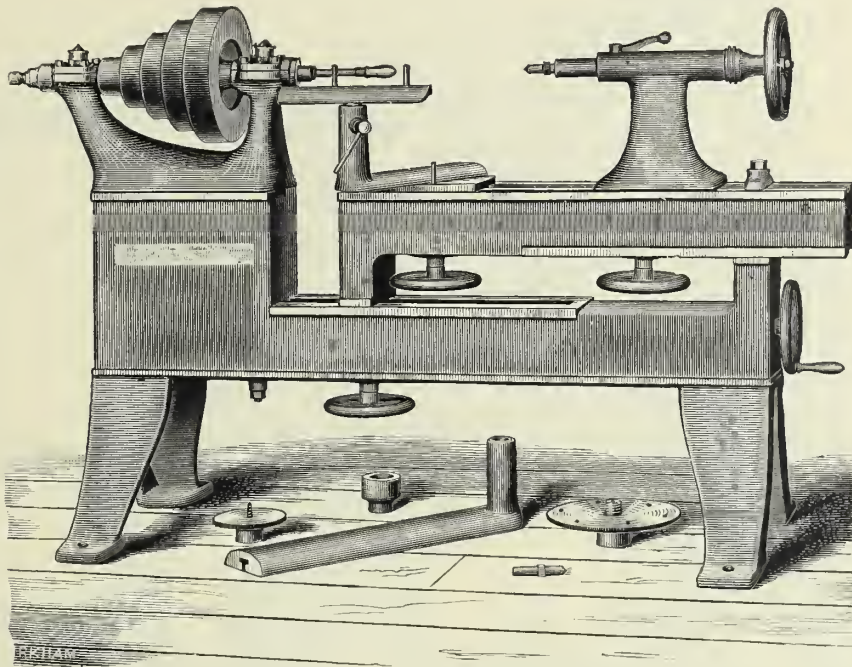
Swing,	-	-	-	-	-	-	-	18 inch	22 inch
Distance between centers,	-	-	-	-	-	-	-	28 inches	26 inches
Length of bed,	-	-	-	-	-	-	-	62 inches	64 inches
Diameter tight and loose pulleys,	-	-	-	-	-	-	-	7 inches	8 inches
Belt for tight and loose pulleys,	-	-	-	-	-	-	-	2½ inches	3 inches
Speed of countershaft,	-	-	-	-	-	-	-	550 revolutions	575 revolutions

We can also supply oval chucks which will turn an oval having 10 inch and 12 inch difference between length and breadth.

Other sizes will be designed to order.

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FIG. 96.



EXTENSION SPINNING LATHE.

THESE LATHES are very substantially built. They have steel spindles running in long, self-oiling bearings, lined with the best Babbitt metal. The bearing caps are planed in and are provided with back pressure screws, thus dispensing with packing and enabling a perfect adjustment to be readily made. The rear end of spindle bears against a block provided with means for keeping it thoroughly oiled. Spindle steps give trouble in most Lathes, because such means are not provided, and while the spindle is in motion it is constantly working the oil away from the center and not allowing any to return.

The cones are made of well-seasoned cherry, to save weight, thus enabling them to be stopped quickly. Wood also gives a better grip to the belt.

The upper part of bed is moved by a screw, and clamped in position by a hand wheel under the main bed.

A nipple and center screw for holding work, a rest bank, two T rests, two centers, one hollow chuck, and two face plates are furnished with each of these Lathes; also a complete countershaft, with self-oiling bearings, and two sets of tight and loose pulleys, to give a wide range of speed for large and small work.

The large Lathe is provided with an extra face plate and with a special bracket and L plate for supporting the rest for very large work.

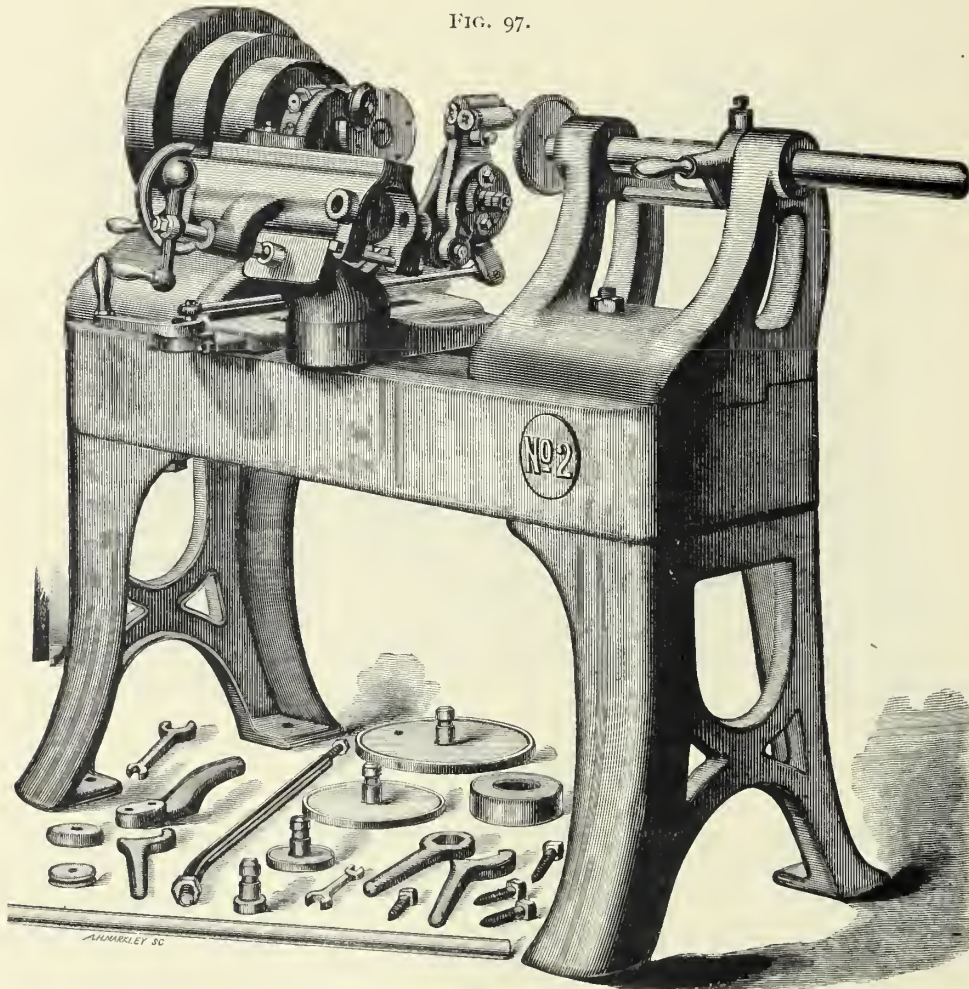
SPECIFICATIONS.

Size of Lathe, - - -	22 inches
Swing of Lathe, - - -	22 inches
Swing of Lathe when extended, -	44 inches
Distance between centers when gap is not used, - - -	25 inches
Distance between centers when gap is used, -	51 inches
Weight, with countershaft, -	1400 pounds

Size of Lathe, - - -	27 inches
Swing of Lathe, - - -	27 inches
Swing of Lathe when extended, -	60 inches
Distance between centers when gap is not used, - - -	25 inches
Distance between centers when gap is used, -	51 inches
Weight, with countershaft, -	3000 pounds

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FIG. 97.



No. 2 SPINNING LATHE.

THESE LATHES are used for finishing drawn or dropped work after it is formed to shape in presses. They consist of a solid heavy frame or shears, mounted on legs (or a pedestal in the smallest size), and supporting a "live head" and a "dead head" as in ordinary lathes, together with special appurtenances for spinning, trimming, and "wiring" work.

They are used to smooth out the "body wrinkles" which generally form in drawn tapering articles, such as cups, pans, wash-basins, breasts, etc., etc. The universal motion of the slide allows the roller to follow the surface of round work of any form. If preferred, the tool can be manipulated by means of the hand lever (shown on floor) instead of using the crank. This is a special advantage in work that has curved profiles, and is a feature not found in Lathes made by other manufacturers. The trimming and wiring attachment is built in an improved form, and so arranged that a simple motion of the hand lever in front does both operations, that is, when swung from right to left, the trimming cutters come forward and do their work. When the motion is reversed the wiring comes forward and the trimmers recede. There is ample adjustment provided to allow for various sizes and shape of work. These Lathes are built very solid and heavy in all their parts to prevent "chatter," and are accurately and carefully fitted up, with scraped surfaces, hardened bolts and nuts. Included with each Lathe are spinning and wiring rolls, trimming cutters, one flat chuck, a set of holding discs, bolts, wrenches, etc.

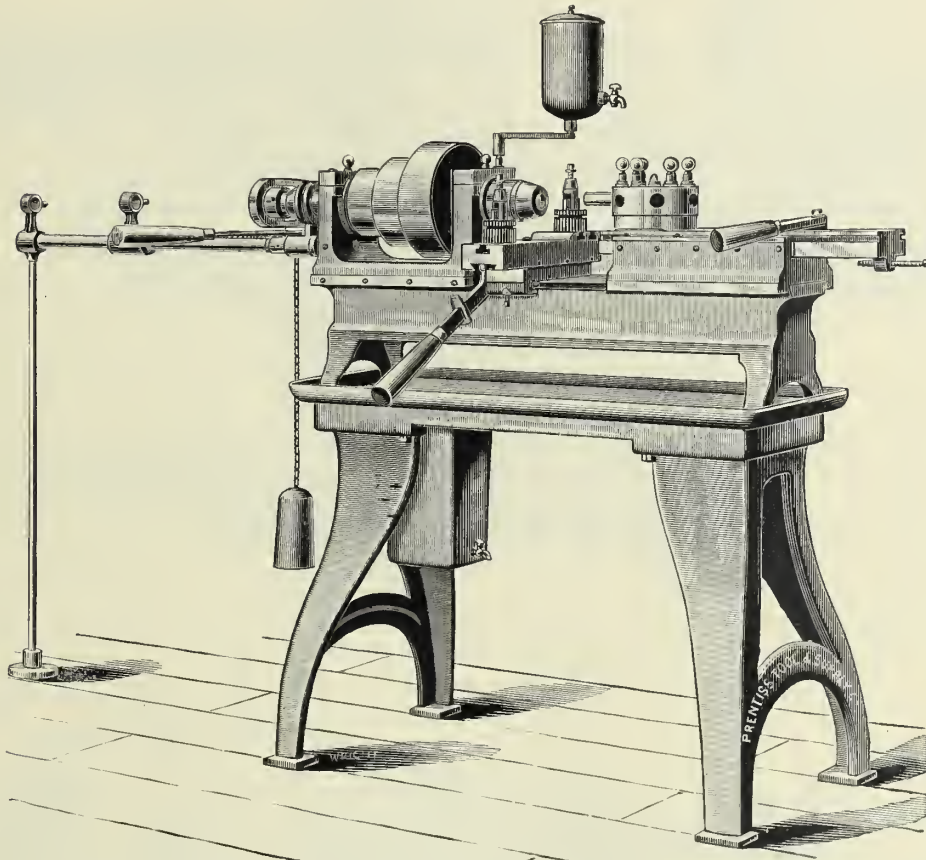
Spinning Lathe No. 1 is for spinning, trimming and wiring small mufin pans, cups, brass goods, etc., not over 10 inches in diameter. Weight, 600 pounds.

Spinning Lathe No. 2 is for spinning, trimming and wiring milk pans, wash-bowls, necks and bases of water-coolers, cuspidors, gas fixture parts, and a great variety of other tin and brass work not exceeding 21 inches in diam. Weight, 1500 pounds.

Spinning Lathe No. 3 is built in same general style as Lathe 2, but much heavier, and is for spinning, trimming and wiring large dish and sauce pans, and other work in brass, copper, etc., up to 32 inches in diameter. Weight, 3500 pounds.

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FIG. 98.



No. 2 PRENTISS SCREW MACHINE WITH WIRE FEED.

WE furnish these machines with or without wire feed. The wire feed is arranged to operate easily, and at the same time grip firmly; it is simple in design and reliable. Two movements of lever feed the stock forward while the machine is in motion, and clamp it ready for another operation. The stock is held by spring collets of varying sizes, which, by holding it firmly, does not mar it. The head can be adjusted on bed by gib screws, thus making it an easy matter to preserve the alignment. The bearings are made of phosphor bronze, and the spindle of hammered steel. The cross slide has two tool posts with adjustable collars, which give a quick and easy adjustment for tools; it has also a stop screw front and back, to regulate depth of cut. The turret has six holes for the reception of tools; the dividing mechanism is made of steel and hardened. The locking pin is hardened and ground. It works in an adjustable taper bushing, and fits into hardened bushings in bottom of turret. The turret slide is provided with a stop screw to regulate the length to be milled, and is operated by a hand lever. A large reservoir is attached to bed of machine for draining the oil, which can be drawn from the bottom. All sliding parts are carefully and properly scraped to a bearing. The machine is furnished with chuck, drip pot, stop, wrenches, and friction countershaft.

SPECIFICATIONS No. 1 MACHINE.

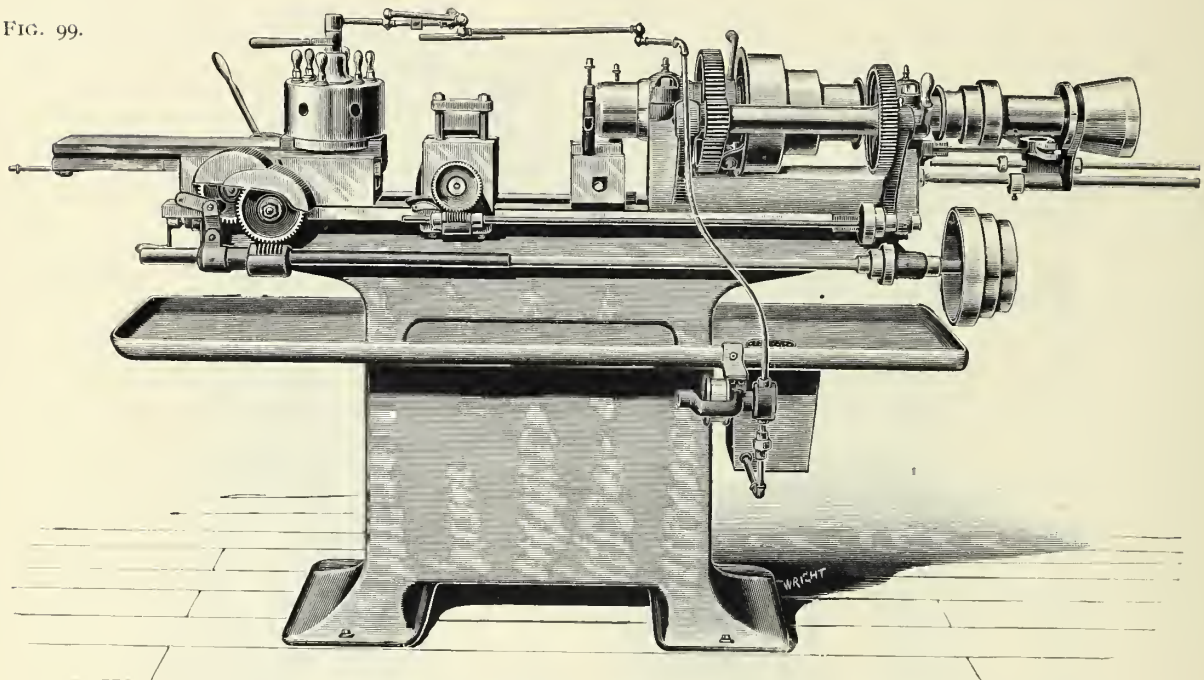
Wire feed capacity,	- - -	1/4 inch to 3/4 inch rod
Without wire feed,	- - -	7/8 inch
Diameter of turret,	- - -	4 1/2 inches
Diameter of holes in turret,	- - -	1 1/8 inch
Movement of turret slide	- - -	3 3/4 inches
Swing over bed,	- - -	9 inches
Friction clutch pulleys,	- - -	10 x 3 inches
Speed of countershaft,	- - -	225 revolutions
Weight,	- - -	500 pounds

SPECIFICATIONS No. 2 MACHINE.

Wire feed capacity,	- - -	1/4 inch to 1 inch
Without wire feed,	- - -	1 5/8 inches
Diameter of turret,	- - -	6 inches
Diameter of holes in turret,	- - -	1 inch
Movement of turret slide,	- - -	6 1/2 inches
Diameter of spindle,	- - -	2 1/4 inches
Swing over bed,	- - -	11 inches
Length of bed,	- - -	3 feet 6 inches
Friction clutch pulleys,	- - -	10 x 4 inches
Speed of countershaft,	- - -	200 revolutions
Weight,	- - -	1000 pounds

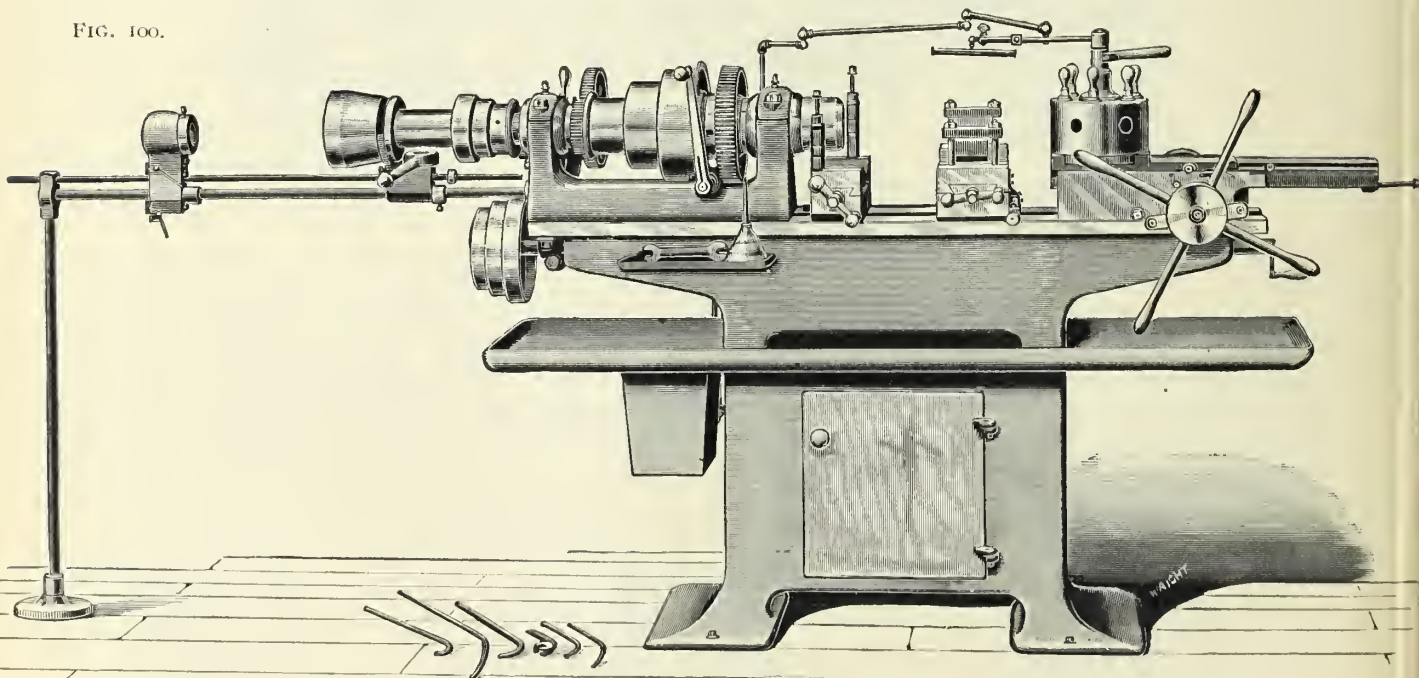
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FIG. 99.



No. 4, 16 INCH, SCREW MACHINE.
REAR VIEW, SHOWING POWER FEEDS.

FIG. 100.



FRONT VIEW, SHOWING WIRE FEED AND CHUCK.



No. 4, 16 INCH SCREW MACHINE.

THIS MACHINE is specially designed for bicycle work, combining many new features of particular value. Every part is absolutely stiff and rigid. All the bearings are large and carefully fitted. The sliding surfaces are all flat and scraped to a bearing, and the arrangement is such that the parts remain in line. There is a $2\frac{1}{4}$ inch hole through the spindle, and a 2 inch hole through the wire feed. The chuck is very strong and simple in construction, and the rod is fed automatically by the action of the chuck lever. The chuck has a wide range of movement permitting the easy handling of rough bars. The short nose of the spindle keeps the work close up to the main bearing, thus preventing all tendency of springing away from the heavy cuts of the double forming tool.

The double forming cross slide is operated by a right and left screw, with power feed, and has a stop motion.

The stationary cut-off is provided with two tool slides, worked by right and left hand screws, making a very powerful arrangement for cutting off, which permits of the use of thinner tools than when one tool only is used.

The double forming slide also has a hand lateral feed.

The turret slide has a ten inch run, the turret revolves automatically and has six holes. The turret stock has a lateral adjustment along the bed, by means of a screw and the lock up to the turret, and both slides are of such construction as to firmly grip the parts without springing.

The head stock is long and rigid, with circular bronze boxes of special construction and cone pulley of large diameter and wide face. The friction clutch, to operate the back gears, is composed of only six pieces, and is self-adjusting and positive in its action.

Every part of this machine has been designed and made for excessive duty, and will be found to be perfectly adapted to the cutting out from solid stock, *Hubs, Bushings, Cones, Bearings and other parts* that go to make up a bicycle, or other similar work.

These machines have double friction countershaft, with 14 inch pulleys, having 4 inch face.

SPECIAL CLASSIFICATION.

CLASS A—Plain machine with cut-off, plain turret, and mounted on cabinet.

CLASS B—Same as class A with the exception that it has power feed to the turret and lever, and screw feed to cross slide, and also hand lateral feed to cross slide.

CLASS C—Same as class B, except it has auxiliary double cut-off.

CLASS D—Same as class C, except it has plain back gears.

CLASS E—Same as class D, except it has friction head.

CLASS F—Same as class E, except it has power feed with double cut-off rest, and double forming slide operated with power feed and stop motion.

CLASS G—Same as class F, but has automatic wire feed and chuck.

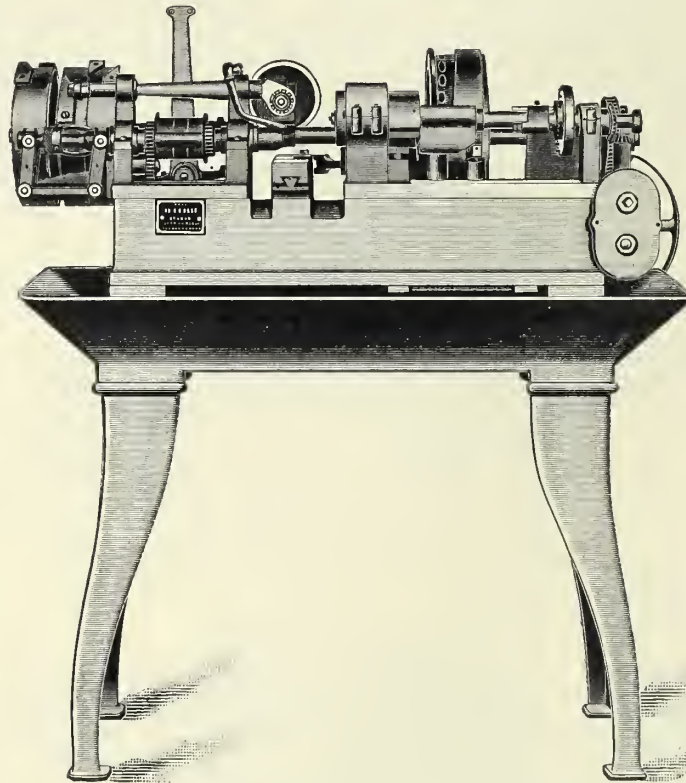
The No. 4, 16 Inch Screw Machine is divided into seven classes as above. In making inquiries, designate which class of machine is desired.

SPECIFICATIONS.

Length of bed,	-	-	-	-	-	-	5 feet 3 inches
Swing,	-	-	-	-	-	-	16 inches
Hole through spindle,	-	-	-	-	-	-	$2\frac{1}{4}$ inches
Hole through wire feed,	-	-	-	-	-	-	2 inches
Width of belt,	-	-	-	-	-	-	3 inches
Diameter of cone,	-	-	-	-	-	-	7, $8\frac{3}{4}$, and $10\frac{1}{2}$ inches
Size of holes in turret,	-	-	-	-	-	-	$1\frac{1}{4}$ inches
Travel of turret,	-	-	-	-	-	-	10 inches
Travel of cross slides,	-	-	-	-	-	-	$3\frac{1}{2}$ inches
Diameter of thread on spindle,	-	-	-	-	-	-	$3\frac{3}{8}$ inches
Weight of Machine,	-	-	-	-	-	-	2500 pounds

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FIG. 100.



No. 3 TURRET AUTOMATIC SCREW MACHINE,
WITH WORM FEED AND SLOTTING DEVICE.

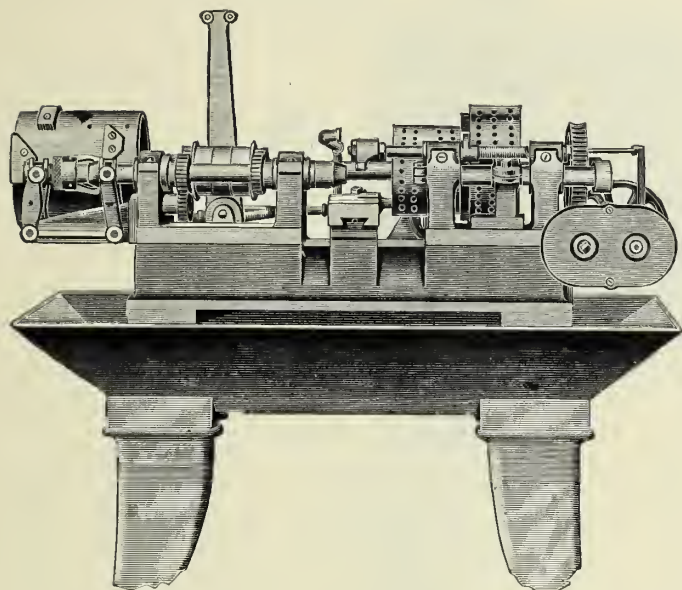
THIS MACHINE is fitted with worm feed instead of segment drum and is designed especially for brass work, also light iron and steel work where rapid production is possible.

When the work requires less tools than the full number of holes in the turret, the vacant holes are turned past the work without loss of time and without the reciprocating movement usually required for each hole in the turret. For example, if a machine constructed to carry five tools is being used on work requiring two or three tools only, the reciprocating movements of the turret would be limited to the number of tools in use. This machine is also furnished without slotting device when desired.

For general description and specifications, see page 110.

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FIG. 101.



No. 3 PLAIN AUTOMATIC SCREW MACHINE.

DESIGNED especially for studs, rollers, pins, milled rivets, short screws, and a great variety of work where the forming may be done with side tools.

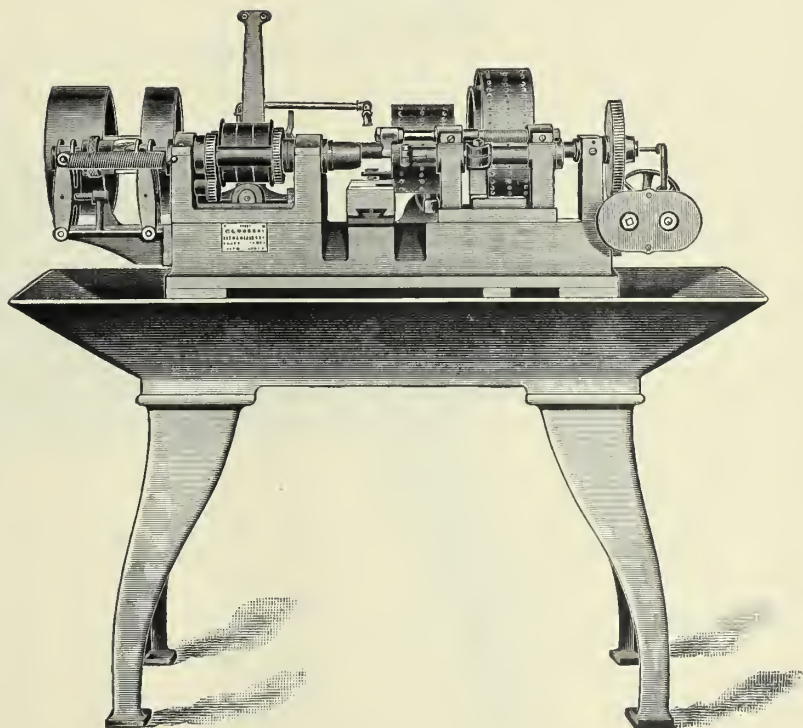
It has no turret, but is provided with a single tool stock in line with the spindle, and a cross slide bearing two tool posts. Has $\frac{3}{8}$ chuck capacity, and is extremely rapid and accurate.

FIG. 102.

No. 4 PLAIN AUTOMATIC SCREW MACHINE.

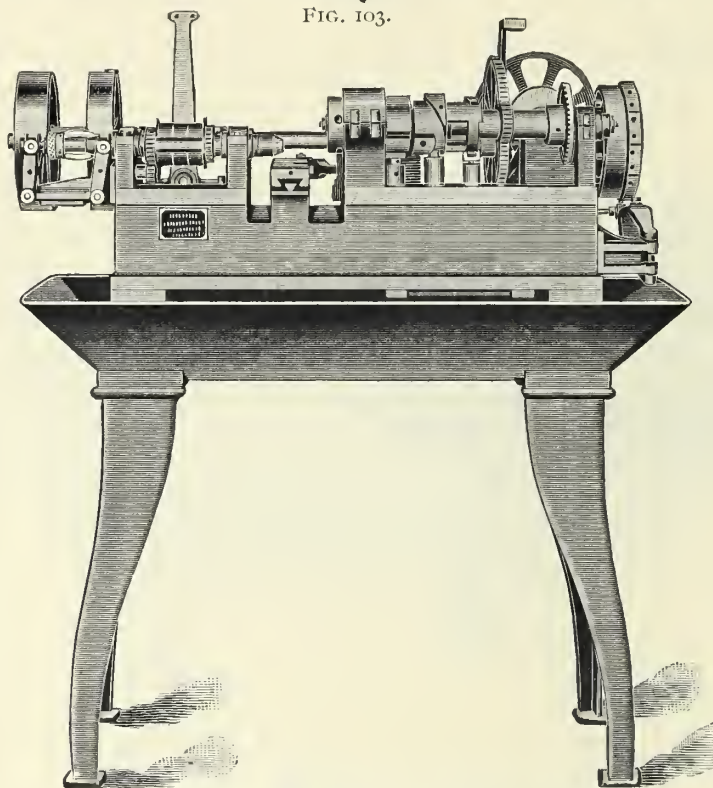
THIS MACHINE is the same as No. 3, above shown, and designed for the same class of work. Is larger in size and has $\frac{5}{8}$ chuck capacity.

For general description and specifications see page 110.



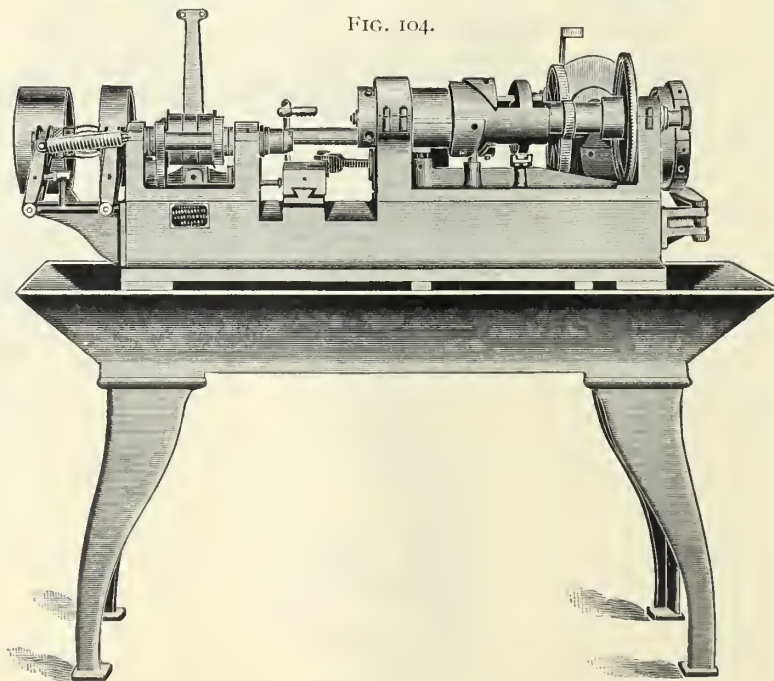
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FIG. 103.



No. 3 TURRET AUTOMATIC SCREW MACHINE.

FIG. 104.

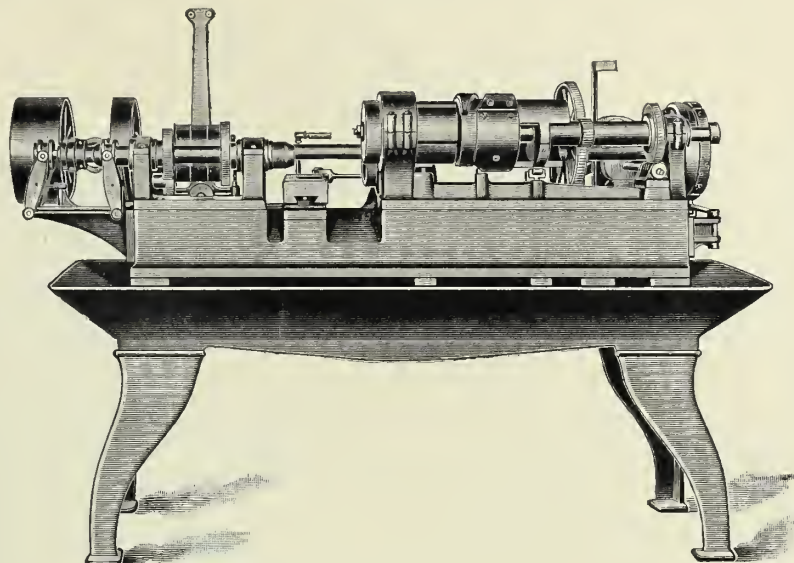


No. 4 TURRET AUTOMATIC SCREW MACHINE.

For general description and specifications, see page 110.

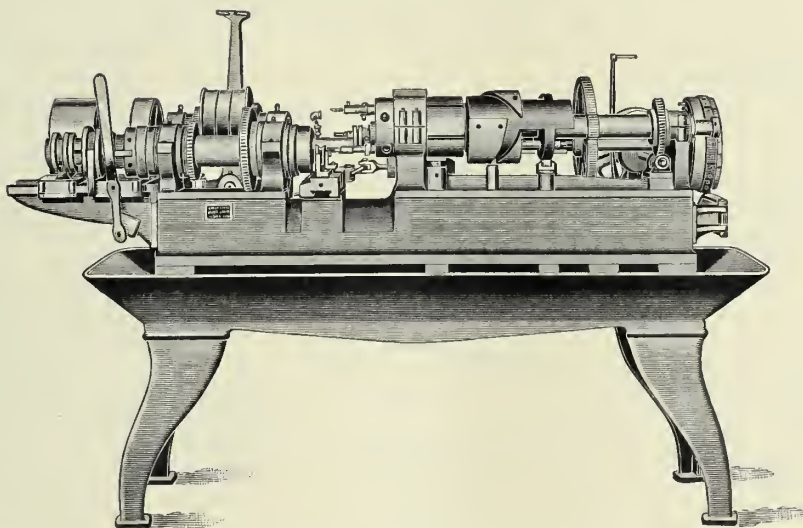
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FIG. 105.



No. 5 TURRET AUTOMATIC SCREW MACHINES.

FIG. 106.



No. 5 1/2 TURRET AUTOMATIC SCREW MACHINE.

For general description and specifications, see page 110.



AUTOMATIC SCREW MACHINES.

GENERAL DESCRIPTION.

Feed Adjustment.—The rapid and independent adjustment of the feed of each tool to suit the work required is an important feature. The operation is so simple that the feed of any of the tools may be changed without stopping the machine. In all other machines of this class, a change of speed for the feed of the tools is obtained in one of two ways; first, by increasing or diminishing the speed of the feeding mechanism, and thus making a uniform change in the feed of all the tools in the series. (The result in such cases being that all tools, excepting one, would work too slow.) The second method is the very expensive process of substituting cams for each different movement required. In our machines the feed of each tool may be adjusted independently and almost instantly, without removing any cams. This enables the operator to get the full cutting power of each tool; he may also change his machines from one job to another in a remarkably short time.

The Spindle.—We have no belt pulling on the spindle, but drive the spindle by gears arranged on a shaft parallel to and behind the spindle, so that a single belt running continuously in one direction will, when shifted from one pulley to the other, drive the spindle alternately in opposite directions, as is required in threading a screw and backing off the die. These gears may be, and usually are, so proportioned that the speed of the spindle is greater when running in one direction than the other. The advantage of this will be apparent when threading a long screw, as the die may be run off the thread screw at a much higher speed than is used in cutting the thread, and certain operations in making the screw, for instance, cutting off the finished screw from the rod, may also be run at the higher speed.

By driving the spindle by these means we avoid the excessive wear caused by the pull of the belts, which has been found to be a serious source of trouble in ordinary screw machines. The wear of the spindle being reduced to a minimum, the alignment of the spindle with the tools is preserved indefinitely, which is a very valuable feature.

The Turret.—The turret for carrying the tools is mounted on a shaft having a horizontal axis parallel with the spindle, the tools being inserted in the end of the turret. It is indexed and locked at its full diameter, and, as the tools are inserted in the end in concentric order and in a circle considerably smaller than the circle in which the locking is effected, the tools are held very rigidly in line with their work.

The Cross Slide.—The cross slide carries two tool posts, one or both of which may be used, as the nature of the work may require.

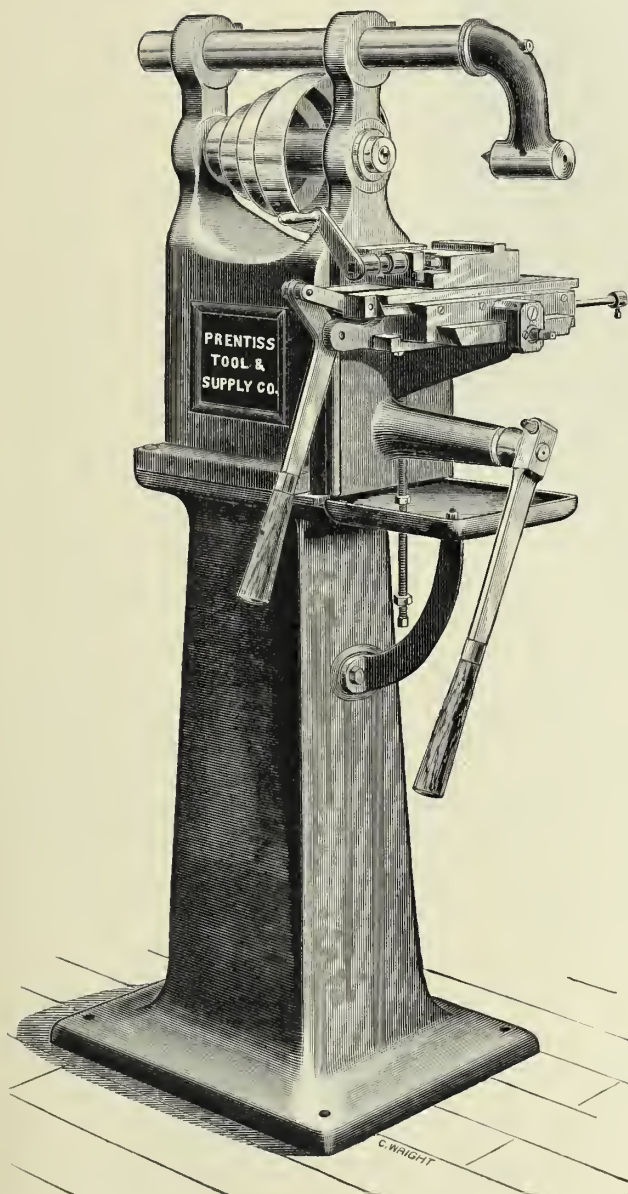
Tools.—The tool posts on all machines are constructed to carry circular forming and cutting-off tools. These tools may be ground on the cutting face without changing their shape, and will, therefore, produce work of uniform shape until completely worn out. Convenient means are provided for accurately adjusting the movements of these tools.

SPECIFICATIONS.

No. of machine,	-	-	-	-	-	3	4	5	5½
Chuck capacity,	-	-	-	-	-	¾ inch	⅝ inch	1 inch	2 inches
Number of holes in turret for tools,	-	-	-	-	-	4 or 5	4 or 5	5	5
Diameter of holes in turret,	-	-	-	-	-	⅝ inch	⅞ inch	1¼ inches	1¼ inches
Length that can be milled,	-	-	-	-	-	1¼ inches	2½ inches	4 inches	4 inches
Speed of countershaft,	-	-	-	-	-	320 rev.	320 rev.	320 rev.	320 rev.
Tight and loose pulleys on countershaft,	-	-	-	-	-	6 x 2 inches	8 x 2 inches	8 x 2½ inches	8 x 2½ inches
Weight with countershaft,	-	-	-	-	-	900 pounds	1600 pounds	2400 pounds	2500 pounds

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FIG. 107.



PRENTISS No. 1 HAND MILLING MACHINE.

THIS MACHINE is designed for milling when the cuts to be taken are short and the work must be done quickly.

The head is mounted on a substantial column, and is furnished with or without overhanging arm. The arm can be adjusted for different lengths of arbors.

The cross sliding table is operated by a hand lever; the movement of same is varied by adjustable stop.

For work requiring a quick vertical movement of carriage, a lever is provided in front of machine, in a convenient position for the operator.

The slide is furnished with an adjustable stop.

A flat base vise for holding work is furnished with the machine.

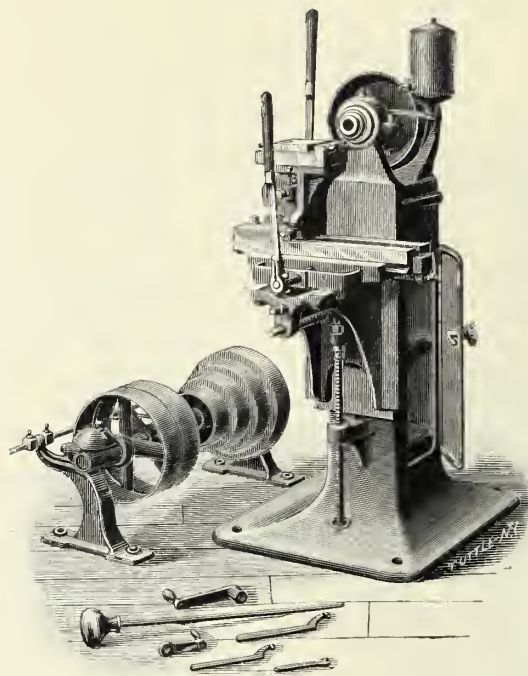
Machine can be made with automatic movement of slide when required.

SPECIFICATIONS.

Length of feed table,	- - -	15 inches
Width of feed table,	- - - -	4 $\frac{3}{8}$ inches
Length of feed,	- - - -	6 inches
Distance from center of spindle to top of table when down,	- - -	6 inches
Distance from center of spindle to top of table when up,	- - -	$\frac{1}{2}$ inch
Diameter of hole in spindle,	- - -	$\frac{1}{2}$ inch
Taper hole in spindle is reamed for Morse Standard No. 2		
Tight and loose pulleys on countershaft,	- - -	8 x 3 inches
Speed of countershaft,	- - -	150 revolutions
Weight, complete,	- - -	640 pounds

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FIG. 108.



No. 3 HAND MILLING MACHINE.

THIS MACHINE is designed for making two or more short cuts in different planes. The table slide has vertical and transverse adjustments operated from front of the knee by crank wrenches

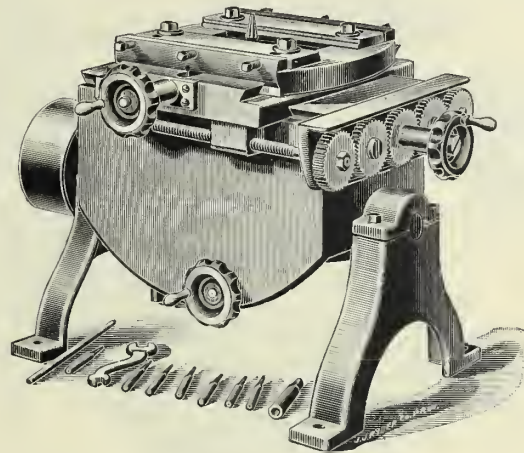
The vertical slide with vise has both horizontal and vertical feeds by rack and pinion operated by hand levers with stops to regulate the length and depth of cut. It may be readily removed and other fixtures bolted to the table if desired. The table has a **T** slot extending its entire length. The spindle is of steel with tapered front bearing, has a hole extending through it, runs in hard bronze boxes, and is provided with ample adjustment for wear. When desired the machine can be furnished with overhanging telescope arm and a table with special two inch oil groove around it.

SPECIFICATIONS.

Size of table,	- - - - -	5¼ x 20 inches
Length of feed,	- - - - -	6 inches
Vertical adjustment under spindle,	- - - - -	0 to 17½ inches
Adjustment in line with spindle,	- - - - -	6 inches
Vertical feed of fixture,	- - - - -	2 inches
Dimensions of front spindle bearing,	- - - - -	4 x 2⅞ inches
Largest diameter of cone,	- - - - -	10⅝ inches
Width of belt required,	- - - - -	2¾ inches
Tight and loose pulleys on countershaft,	- - - - -	12 x 3 inches
Speed of countershaft,	- - - - -	120 revolutions
Weight,	- - - - -	1000 pounds

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FIG. 109.



INVERTED HAND MILLING MACHINE.

THIS MACHINE is built especially for manufacturers of Silver Ware, Jewelry, Fire Arms or any business requiring Blanking or Trimming Dies. The principal features of the construction of the machine will be understood from the engraving, in which it is seen that the frame proper is supported upon gudgeons at either side, which are clamped in their bearings, and serve to hold the frame in any desired position, i. e., horizontal, or at any desired inclination in either direction. The object of this is simply for the convenience of the operator and so that he may secure upon the surface of the work and the lines drawn upon it the best possible light.

Through the right-hand gudgeon passes the shaft on which is placed the driving pulley. At the other end of this shaft is a bevel gear, which, by means of another bevel gear, drives the spindle.

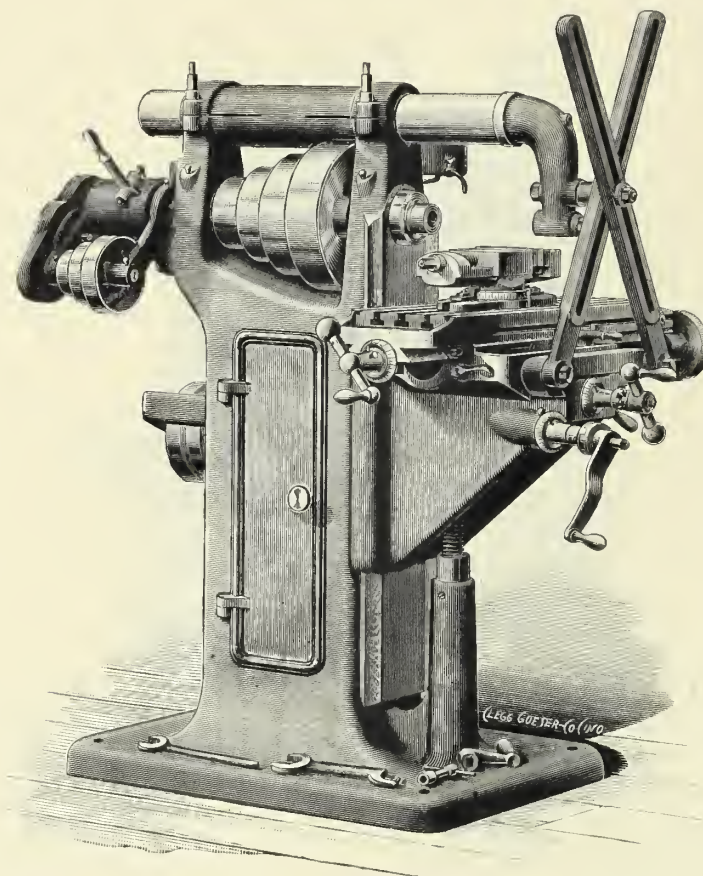
This spindle is vertical and has a vertical adjustment. It carries at the upper end the mill by which the cutting is done, this mill being of the ordinary stem-cutter type, with taper shank, and with the cutting portion also tapered to suit the amount of clearance desired in the die.

This cutter projects through an opening in the bottom of the chuck, over which opening the work is placed. The chuck is moved in either direction by means of the two slides and screws at right angles to each other, and thus by means of the crank handles the lines laid out on the surface of the work can be accurately followed. It is necessary only to drill one hole through the portion of the die which is to be removed, and the cutter started in at this hole removes the entire center in a single piece.

The machine is so designed and fitted up that the movement of the slides is smooth and under perfect control, special provision being made for taking up all lost motion. As would be expected by any mechanic experienced in such work as this machine is designed for, it has proven in use to be very efficient and satisfactory in every way. Two sizes are built, the smaller of which will hold a plate 6 inches wide, $\frac{5}{8}$ thick and any length; the larger machine, 10 inches wide, $2\frac{1}{2}$ inches thick and any length. If desirable the smaller machine can be placed on a work bench.

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FIG. 110.



No. 1 CINCINNATI PLAIN MILLING MACHINE.

THE column, knee, saddle, table, overhanging arm, spindle and bearings of this machine are of ample proportions to insure rigidity and wearing qualities at all points subject to strain and service. In spindle power and strength of feed it is unexcelled.

Facility of Manipulation.—The means for adjusting and operating the machine are so located and contrived as to consume the least possible time of the operator. The shaft for vertical motion is placed at an oblique angle and carries a clutch crank. This arrangement of shaft, in connection with permanent handles on screws for cross and longitudinal adjustment of table, gives the operator control of every adjustment without the necessity of changing his position or shifting handles. Two adjustments may be made simultaneously. All adjustments are indicated in thousandths of an inch by large readable dials. The table is provided with a quick return. The saddle or carriage for table is firmly locked when in position by pushing down small lever shown on the left side of saddle. The cylindrical overhanging arm is used on all machines. Its advantages of quick removal and adjustment are evident. It is made of ample diameter, and when in position is rigidly clamped at two points. It is provided with an adjustable phosphor bronze bushing, forming a perfect cylindrical support for the end of cutter arbor.



No. 1 CINCINNATI PLAIN MILLING MACHINE.

General Description Continued.

Feed Variation.—In this machine, through a very simple mechanism at the back end of spindle, twelve distinct changes in the feed (progressing uniformly) are obtained for every spindle speed. A pointer on the end of lever shown indicates on a dial the feed at which the machine is being operated. Throwing this lever from one side to the other has the effect of doubling the feed or reducing it by one-half, an advantage in taking roughing and finishing cuts, etc. No belts or pulleys need be removed to effect these changes. The feed pulleys are of large diameter, and one and a half inch wide belts are used. On the coarse feeds the driving power is greatest.

The Feed to table is automatic in either direction, instantly reversed by a lever conveniently located at front of machine. This feature on some classes of work largely increases the output over machines with feed for table in one direction only. The table is automatically tripped in either direction by a dog so constructed as to permit a further adjustment by hand without the necessity of releasing dog. This is a convenience to the operator when examining work. The table is provided with oil channels and pockets at both ends.

Spindle.—The spindles are made of crucible steel and are hollow. The front bearing is cast iron, lined with Babbitt metal. It is tapered and solid. All driving pulleys have four steps, and in connection with the double friction countershaft which is furnished, a wide range of spindle speeds is obtained. This wide range in spindle speeds is very necessary where extremely small and large cutters are used.

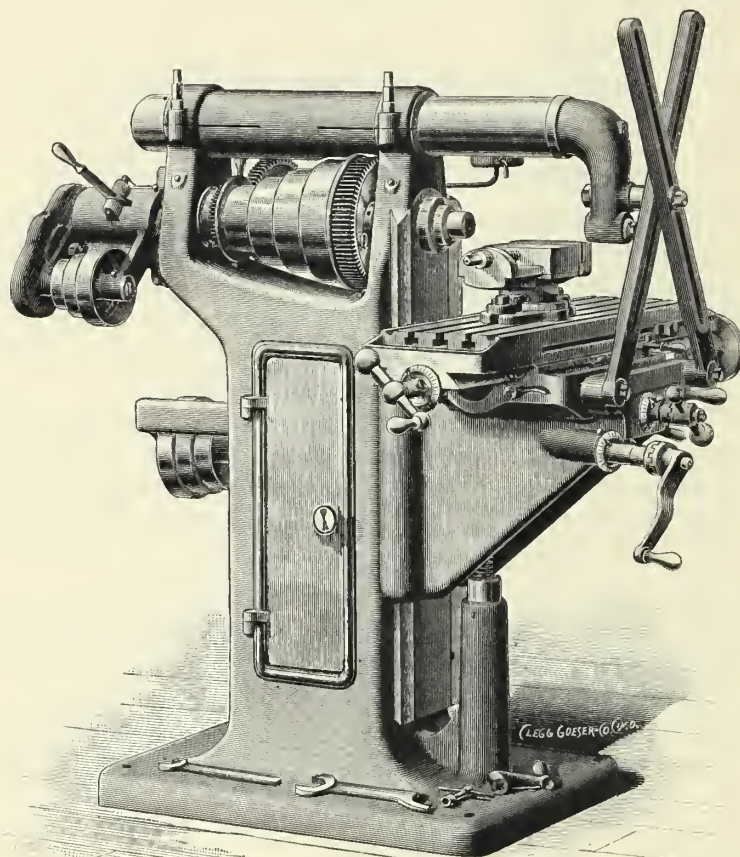
Workmanship.—In materials and workmanship this machine is guaranteed strictly of the highest class. Cylindrical and conical bearings wherever advisable are hardened and ground. Provision is made throughout for taking up wear.

SPECIFICATIONS.

Net weight,	-	-	-	-	-	-	1765 pounds
Shipping weight about,	-	-	-	-	-	-	2000 pounds
Length of automatic feed to table,	-	-	-	-	-	-	21 inches
Cross motion in line with spindle,	-	-	-	-	-	-	6 inches
Vertical range,	-	-	-	-	-	-	19 inches
Size of table over all,	-	-	-	-	-	-	36 x 9 inches
Working surface of table,	-	-	-	-	-	-	30 x 9 inches
Largest diameter of driving pulley,	-	-	-	-	-	-	12 inches
Number of steps on driving pulley,	-	-	-	-	-	-	4
Width of driving belt,	-	-	-	-	-	-	3 inches
Number of feed changes,	-	-	-	-	-	-	12
Variations in feed to 1 revolution of spindle,	-	-	-	-	-	-	.006 to .187
Width of feed belt,	-	-	-	-	-	-	1½ inches
Centre of spindle to overhanging arm,	-	-	-	-	-	-	6⅞ inches
Diameter of overhanging arm,	-	-	-	-	-	-	3¾ inches

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FIG. III.



No. 2 PLAIN MILLING MACHINE,

BACK GEARED.

THE column, knee, saddle table, overhanging arm, spindle and bearings of these machines are of ample proportions to insure rigidity and wearing qualities at all points subject to strain and service. In spindle power and strength of feed they are unexcelled.

Facility of Manipulation.—The means for adjusting and operating the machine are so located and contrived as to consume the least possible time of the operator. The shaft for vertical motion is placed at an oblique angle and carries a clutch crank. This arrangement of shaft in connection with permanent handles on screws for cross and longitudinal adjustment of table, gives the operator control of every adjustment without the necessity of changing his position or shifting handles. Two adjustments may be made simultaneously. All adjustments are indicated in thousandths of an inch by large readable dials. The table is provided with a quick return. The saddle or carriage for table is firmly locked when in position by pushing down small lever shown on the left side of saddle. The cylindrical overhanging arm is used on all machines. Its advantages of quick removal and adjustment are evident. It is made of ample diameter, and when in position is rigidly clamped at two points. It is provided with an adjustable phosphor bronze bushing, forming a perfect cylindrical support for the end of cutter arbor.



No. 2 CINCINNATI PLAIN MILLING MACHINE,

BACK GEARED.

General Description, Continued.

Feed Variation.—In this machine, through a very simple mechanism at the back end of spindle, twelve distinct changes in the feed (progressing uniformly) are obtained for every spindle speed. A pointer on the end of lever shown indicates on a dial the feed at which the machine is being operated. Throwing this lever from one side to the other has the effect of doubling the feed or reducing it by one-half, an advantage in taking, roughing and finishing cuts, etc. No belts or pulleys need be removed to effect these changes. The feed pulleys are of large diameter, and one and a half inch wide belts are used. On the coarse feeds the driving power is greatest.

The Feed to table is automatic in either direction, instantly reversed by a lever conveniently located at front of machine. This feature on some classes of work largely increases the output over machines with feed for table in one direction only. The table is automatically tripped in either direction by a dog so constructed as to permit a further adjustment by hand without the necessity of releasing dog. This is a convenience to the operator when examining work. The table is provided with oil channels and pockets at both ends.

Spindle.—The spindles are made of crucible steel and are hollow. The front bearing is cast iron, lined with Babbitt metal. It is tapered and solid. All driving pulleys have four steps, and in connection with the double friction countershaft which is furnished, sixteen spindle speeds are obtained on this machine. This wide range in spindle speeds is very necessary where extremely small and large cutters are used.

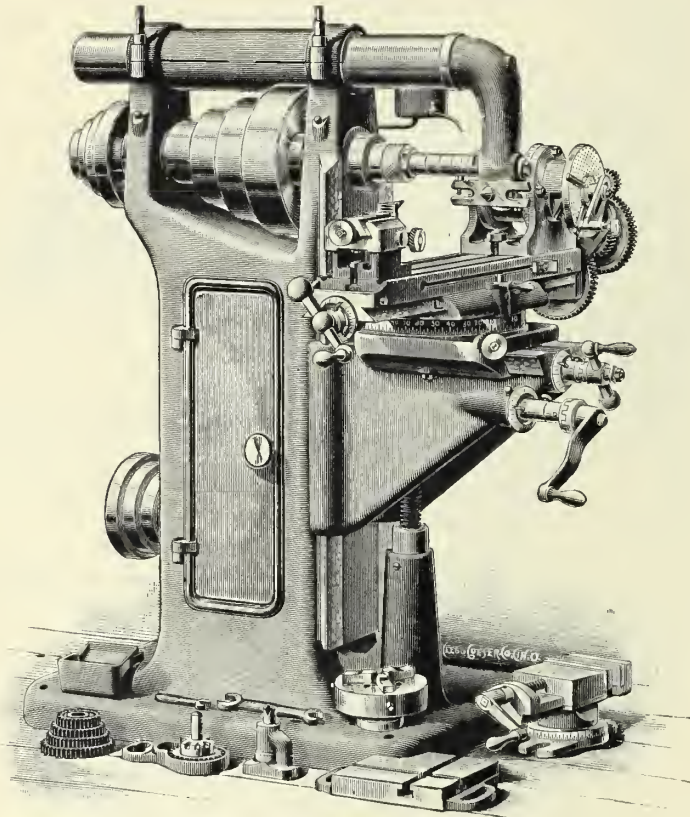
Workmanship.—In materials and workmanship this machine is guaranteed strictly of the highest class. Cylindrical and conical bearings wherever advisable are hardened and ground. Provision is made throughout for taking up wear.

SPECIFICATIONS.

	2	3
Number of machine, - - - - -	2	3
Net weight, - - - - -	2000 pounds	2850 pounds
Shipping weight, about - - - - -	2300 pounds	3150 pounds
Length of automatic feed to table, - - - - -	24 inches	32 inches
Cross motion in line with spindle, - - - - -	7 inches	8 inches
Vertical range, - - - - -	19 inches	20 inches
Size of table over all, - - - - -	40 x 10 inches	51 x 12 inches
Working surface of table, - - - - -	34 x 10 inches	44 x 12 inches
Largest diameter of driving pulley, - - - - -	10 inches	11½ inches
Number of steps on driving pulley, - - - - -	4	4
Width of driving belt, - - - - -	2¾ inches	3 inches
Number of feed changes, - - - - -	12	12
Variations in feed to 1 revolution of spindle, - - - - -	.006 to .187	.006 to .187
Width of feed belt, - - - - -	1½ inches	1½ inches
Center of spindle to overhanging arm, - - - - -	5⅞ inches	6⅞ inches
Diameter of overhanging arm, - - - - -	4 inches	4½ inches

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FIG. 112.



IMPROVED No. 1 CINCINNATI UNIVERSAL TOOL ROOM MILLING MACHINE.

THIS illustration represents an entirely new Universal Tool Room Milling Machine, embodying the very latest ideas.

Strength.—The column, knee, saddle, table, overhanging arm, spindle and bearings are of ample proportions to insure rigidity and wearing qualities at all points subject to strain and service. In spindle power and strength of feed this machine is unexcelled.

Facility of Manipulation.—The means for adjusting and operating the machine are so located and contrived as to consume the least possible time of the operator. The shaft for vertical motion is placed at an oblique angle and carries a clutch crank. This arrangement of shaft, in connection with permanent handles on screws, for cross and longitudinal adjustment of table, gives the operator control of every adjustment without the necessity of changing his position or shifting handles. Two adjustments may be made simultaneously. All adjustments are indicated in thousandths of an inch by large readable dials. The table is provided with a quick return. The cylindrical overhanging arm is used on all machines. Its advantages of quick removal and adjustment are evident. It is made of ample diameter, and when in position is rigidly clamped at two points. It is provided with an adjustable phosphor bronze bushing, forming a perfect cylindrical support for the end of cutter arbor. The arbor is withdrawn by forcing the nut on it against the end of spindle.



IMPROVED No. 1 CINCINNATI UNIVERSAL TOOL ROOM MILLING MACHINE.

General Description, Continued.

A Distinctive Feature of this machine is the circular form of the swiveling carriage for table. This not only adds to the appearance, but is of especial practical value when cutting spirals or any work requiring the setting of the table at an angle. It is apparent that the swiveling carriage need not be drawn out from the face of column to the same extent as when made square, permitting at the same time the use of a shorter cutter arbor. Again, the swiveling carriage always has its full bearing on slide on top of knee, no matter at what angle the table is set. This permits further a most effective method for clamping the swiveling carriage to slide on knee. Two accessible bolts operating in a circular slot absolutely bind these two parts together. The above points all add to the rigidity of the machine under cutting operation. The index for angles of spirals is placed on the outside of the circular carriage, where it may be conveniently read. The table may be completely revolved and spirals beyond 45 degrees cut. It is provided with oil channels and pockets at both ends.

The automatic feed to table is started, stopped or reversed by levers, conveniently located and operated from front of machine. It is automatically tripped in either direction by a dog, so constructed as to permit a further adjustment by hand, without the necessity of releasing dog. This is a convenience to the operator when examining work.

Spindle.—The spindles are made of crucible steel and are hollow. The front bearing is cast iron, lined with Babbitt metal. It is tapered and solid. All driving pulleys have four steps, and in connection with the double friction countershaft, which is furnished, eight spindle speeds are obtained. This wide range in spindle speeds is very necessary where extremely small and large cutters are used.

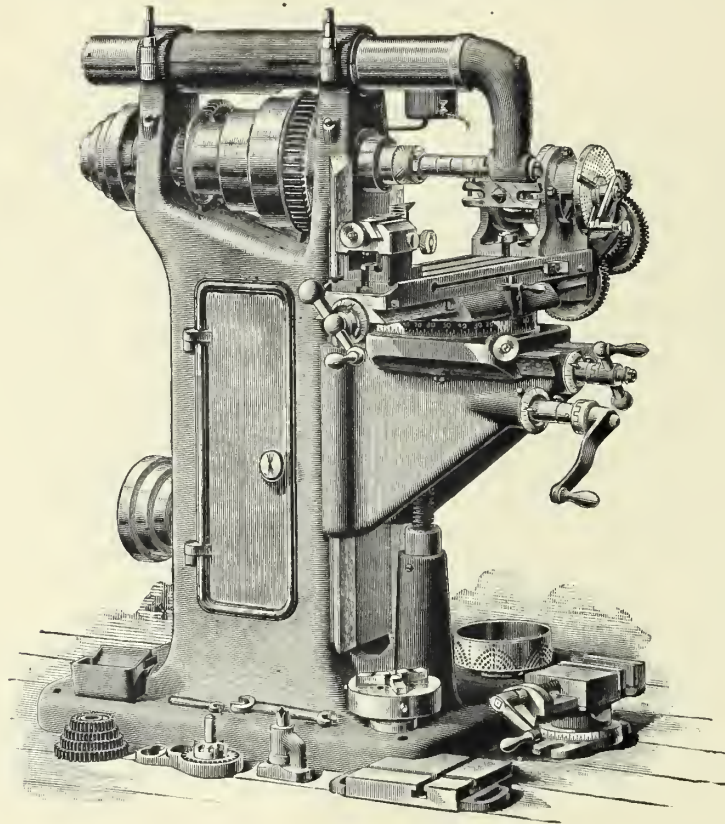
The Universal Indexing and Dividing Head has a number of new features and improvements. It is distinctly universal, as the swiveling block carrying the spindle makes a complete revolution. This is an important feature and of great advantage on certain classes of work. In starting a cutter on work held at an angle, such as bevel wheels, etc., it has been a difficult matter to prevent gouging of the cutter. This difficulty is entirely overcome in this machine by swinging spindle over to opposite, thereby changing the character of the cut. With the work held in this position, heavier cuts may be taken and a smoother finish obtained. Right and left hand work may be cut without changing the cutters. The spindle is firmly held at any angle, ample means being provided for locking it rigidly in any position. The block carrying the spindle is always fully contained within its bearings, no matter at what angle the spindle is held. There is also a device for locking the spindle during cutting operation, to relieve all parts from unnecessary wear. The universal heads furnished have an extra cup-shaped dial plate for rapid indexing. The tail-stock has the patent adjustable centre bar, on one end of which is a full round centre, and on the other a centre with the top milled off. The centre bar is raised and lowered by means of rack and pinion for taper work. The universal head is provided with a complete set of change gears and all necessary spirals right and left hand are cut automatically and divisions made up to three hundred and sixty. Everything shown in cut, including double friction countershaft, is furnished.

SPECIFICATIONS.

Net weight,	-	-	-	-	-	-	1,775 pounds
Shipping weight, about	-	-	-	-	-	-	2,000 pounds
Length of automatic feed and table,	-	-	-	-	-	-	20 inches
Cross motion in line with spindle,	-	-	-	-	-	-	6 inches
Vertical range,	-	-	-	-	-	-	17 inches
Size of table over all,	-	-	-	-	-	-	35 x 6 inches
Working surface of table,	-	-	-	-	-	-	33 x 6 inches
Index centre swing,	-	-	-	-	-	-	10 inches
Index centres taken in length,	-	-	-	-	-	-	15 inches
Largest diameter of driving pulley,	-	-	-	-	-	-	12 inches
Number of steps on driving pulley,	-	-	-	-	-	-	4
Width of driving belt	-	-	-	-	-	-	3 inches
Number of feed changes,	-	-	-	-	-	-	4
Centre of spindle to overhanging arm,	-	-	-	-	-	-	6¼ inches

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FIG. 113.



IMPROVED No. 1 1/2 CINCINNATI UNIVERSAL TOOL ROOM MILLING MACHINE.

THE illustration represents an entirely new Universal Tool Room Milling Machine, embodying the very latest ideas in modern machine construction.

Strength.—The column, knee, saddle table, overhanging arm, spindle and bearings are of ample proportions to insure rigidity and wearing qualities at all points subject to strain and service. In spindle power and strength of feed this machine is unexcelled.

Facility of Manipulation.—The means for adjusting and operating the machine are so located and contrived as to consume the least possible time of the operator. The shaft for vertical motion is placed at an oblique angle and carries a clutch crank. This arrangement of shaft, in connection with permanent handles on screws for cross and longitudinal adjustment of table, gives the operator control of every adjustment without the necessity of changing his position or shifting handles. Two adjustments may be made simultaneously. All adjustments are indicated in thousandths of an inch by large readable dials. The table is provided with a quick return. The cylindrical overhanging arm is used on this machine. Its advantages of quick removal and adjustment are evident. It is made of ample diameter, and when in position is rigidly clamped at two points. It is provided with an adjustable phosphor bronze bushing, forming a perfect cylindrical support for the end of cutter arbor. The arbor is withdrawn by forcing the nut on it against the end of spindle.



IMPROVED No. 1½ CINCINNATI UNIVERSAL TOOL ROOM MILLING MACHINE.

General Description, Continued.

A DISTINCTIVE FEATURE of this machine is the circular form of the swiveling carriage for table. This not only adds to the appearance, but is of especial practical value when cutting spirals of any work requiring the setting of table at an angle. It is apparent that the swiveling carriage need not be drawn out from the face of column to the same extent as when made square, permitting at the same time the use of a shorter cutter arbor. Again, the swiveling carriage always has its full bearing on slide on top of knee, no matter at what angle the table is set. This permits further a most effective method for clamping the swiveling carriage to slide on knee. Two accessible bolts operating in a circular slot absolutely bind these two parts together. The above points all add to the rigidity of the machine under cutting operation. The index for angles of spirals is placed on the outside of the circular carriage where it may be conveniently read. The table may be completely revolved and spirals beyond 45 degrees cut. It is provided with oil channels and pockets at both ends.

The automatic feed to table is started, stopped or reversed by levers conveniently located and operated from front of machine. It is automatically tripped in either direction by a dog, so constructed as to permit a further adjustment by hand without the necessity of releasing dog. This is a convenience to the operator when examining work.

Spindle.—The spindles are made of crucible steel and are hollow. The front bearing is cast iron, lined with Babbitt metal. It is tapered and solid. The driving pulley has three steps, and, in connection with the double friction countershaft, which is furnished, twelve spindle speeds are obtained. This wide range in spindle speeds is very necessary where extremely small and large cutters are used.

The universal indexing and dividing head has a number of new features and improvements.

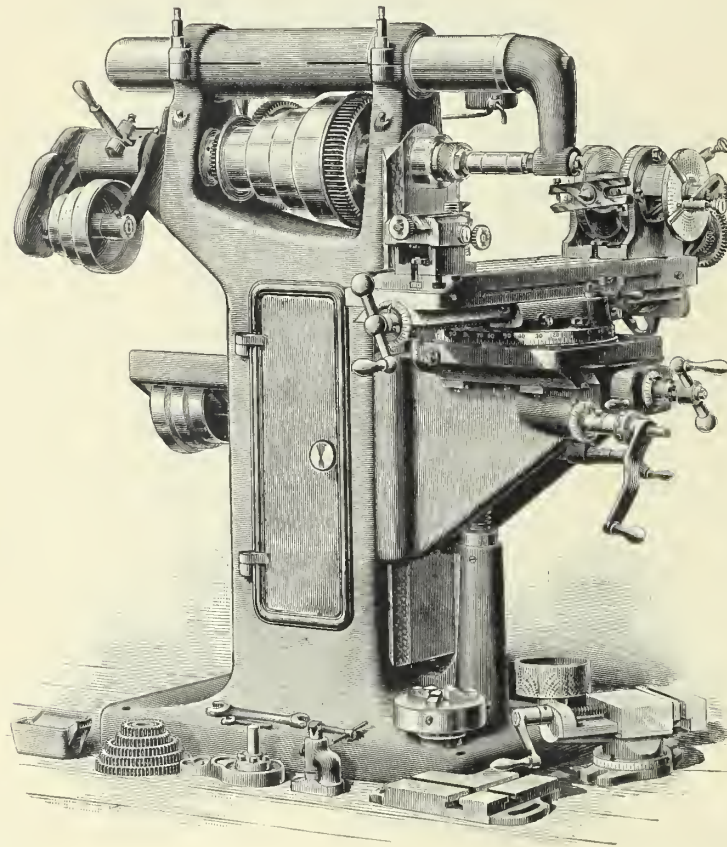
Workmanship.—In materials and workmanship this machine is guaranteed strictly of the highest class. Cylindrical and conical bearings wherever advisable are hardened and ground. Provision is made throughout for taking up wear.

SPECIFICATIONS.

Net weight,	-	-	-	-	-	-	-	1800 pounds
Shipping weight, about	-	-	-	-	-	-	-	2050 pounds
Length of automatic feed to table,	-	-	-	-	-	-	-	20 inches
Cross motion in line with spindle,	-	-	-	-	-	-	-	6 inches
Vertical range,	-	-	-	-	-	-	-	17 inches
Size of table over all,	-	-	-	-	-	-	-	35 x 6 inches
Working surface of table,	-	-	-	-	-	-	-	33 x 6 inches
Index centers swing,	-	-	-	-	-	-	-	10 inches
Index centers take in length,	-	-	-	-	-	-	-	15 inches
Largest diameter of driving pulley,	-	-	-	-	-	-	-	10 inches
Number of steps on driving pulley,	-	-	-	-	-	-	-	3
Width of driving belt,	-	-	-	-	-	-	-	2¾ inches
Number of feed changes,	-	-	-	-	-	-	-	4
Center of spindle to overhanging arm,	-	-	-	-	-	-	-	6¼ inches

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FIG. 114.



IMPROVED No. 2 CINCINNATI UNIVERSAL TOOL ROOM MILLING MACHINE.

THE illustration represents the design of an entirely new Universal Tool Room Milling Machine, embodying the very latest ideas in modern machine construction.

Strength.—The column, knee, saddle table, overhanging arm, spindle and bearings are of ample proportions to insure rigidity and wearing qualities at all points subject to strain and service. In spindle power and strength of feed this machine is unexcelled.

Facility of Manipulation.—The means for adjusting and operating the machine are so located and contrived as to consume the least possible time of the operator. The shaft for vertical motion is placed at an oblique angle and carries a clutch crank. This arrangement of shaft, in connection with permanent handles on screws for cross and longitudinal adjustment of table, gives the operator control of every adjustment without the necessity of changing his position or shifting handles.



IMPROVED No. 2 CINCINNATI UNIVERSAL MILLING MACHINE.

General Description Continued.

TWO adjustments may be made simultaneously. All adjustments are indicated in thousandths of an inch by large readable dials. The table is provided with a quick return. The cylindrical overhanging arm is used on all machines. Its advantages of quick removal and adjustment are evident. It is made of ample diameter, and when in position is rigidly clamped at two points. It is provided with an adjustable phosphor bronze bushing, forming a perfect cylindrical support for the end of cutter arbor. The arbor is withdrawn by forcing the nut on it against the end of spindle.

Feed Variation.—Heretofore the variation in the feed of milling machines has been insufficient. In this machine through a very simple mechanism at the back end of spindle, twelve distinct changes in the feed (progressing uniformly) are obtained for every spindle speed. A pointer on the end of lever shown indicates on a dial the feed at which the machine is being operated. Throwing this lever from one side to the other has the effect of doubling the feed or reducing it by one-half, an advantage in taking roughing and finishing cuts, etc. No belts or pulleys need be removed to effect these changes. The feed pulleys are of large diameter, and one and a half inch wide belts are used. On the coarse feeds the driving power is greatest.

Automatic Feeds.—This machine not only has an automatic longitudinal feed to table, but also an automatic cross motion in line with spindle. An automatic vertical feed is supplied to order. All feeds are started, stopped or reversed by levers conveniently located and operated from front of machine. In the larger machines, to facilitate adjustment by hand, the screw for vertical motion is provided with anti-friction bearings.

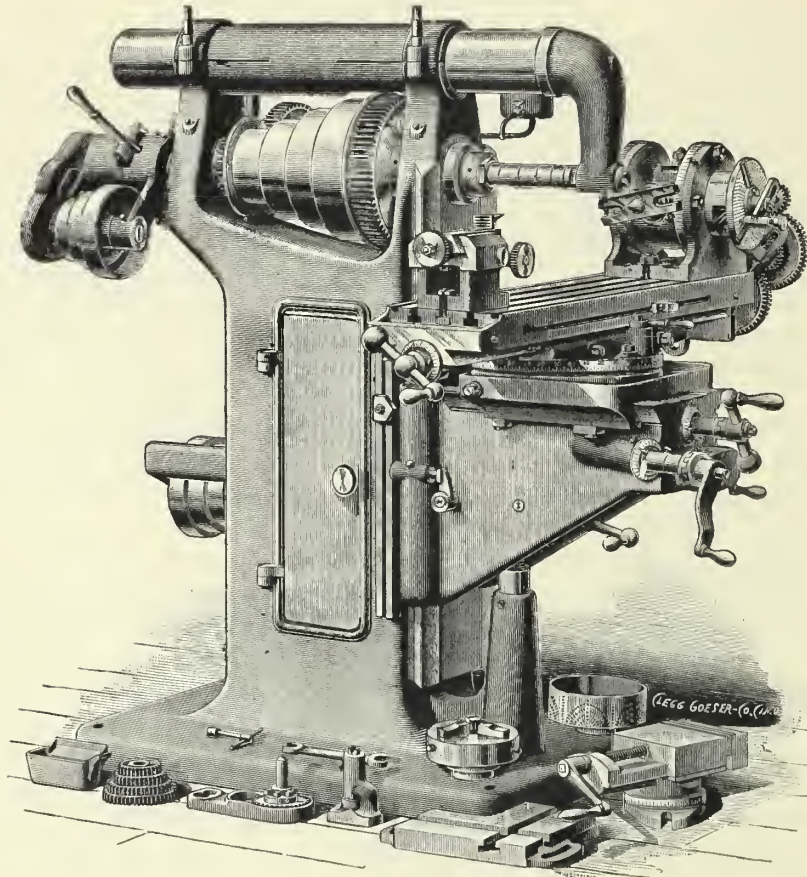
The Universal Indexing and Dividing Head has a number of new features and improvements. It is distinctly universal, as the swiveling block carrying the spindle makes a complete revolution. This is an important feature and of great advantage on certain classes of work. In starting a cutter on work held at an angle, such as bevel wheels, etc., it has been a difficult matter to prevent gouging of the cutter. This difficulty is entirely overcome in this machine by swinging spindle over to the opposite side, thereby changing the character of the cut. With the work held in this position, heavier cuts may be taken and a smoother finish obtained. Right and left hand work may be cut without changing the cutters. The spindle is firmly held at any angle, ample means being provided for locking it rigidly in any position. The block carrying the spindle is always fully contained within its bearings, no matter at what angle the spindle is held. There is also a device for locking the spindle during cutting operation, to relieve all parts from unnecessary wear. The universal heads furnished have an extra cup-shaped dial plate for rapid indexing. The tail-stock has the patent adjustable center bar, on one end of which is a full round center and on the other a center with the top milled off. The center bar is raised and lowered by means of rack and pinion for taper work. The universal head is provided with a complete set of change gears, and all necessary spirals right and left hand are cut automatically and divisions made up to three hundred and sixty. Everything shown in cut, including double friction countershaft, is furnished.

SPECIFICATIONS.

Net weight,	-	-	-	-	-	-	2100 pounds
Shipping weight about,	-	-	-	-	-	-	2400 pounds
Length of automatic feed to table,	-	-	-	-	-	-	23 inches
Cross motion in line with spindle,	-	-	-	-	-	-	6½ inches
Vertical range,	-	-	-	-	-	-	18½ inches
Size of table over all,	-	-	-	-	-	-	38 x 8 inches
Working surface of table,	-	-	-	-	-	-	35 x 8 inches
Index centers swing,	-	-	-	-	-	-	10 inches
Index centers take in length,	-	-	-	-	-	-	17 inches
Largest diameter of driving pulley,	-	-	-	-	-	-	10 inches
Number of steps on driving pulley,	-	-	-	-	-	-	4
Width of driving belt,	-	-	-	-	-	-	2¾ inches
Number of feed changes,	-	-	-	-	-	-	12
Variation in feed to 1 revolution of spindle	-	-	-	-	-	-	.006 to .150
Width of belt,	-	-	-	-	-	-	1½ inches
Center of spindle to overhanging arm,	-	-	-	-	-	-	5⅞ inches
Diameter of overhanging arm,	-	-	-	-	-	-	4 inches

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FIG. 115.



IMPROVED No. 3 CINCINNATI UNIVERSAL TOOL ROOM MILLING MACHINE.

THE illustration represents the design of an entirely new Universal Tool Room Milling Machine, embodying the very latest ideas in modern machine construction.

Strength.—The column, knee, saddle table, overhanging arm, spindle and bearings are of ample proportions to insure rigidity and wearing qualities at all points subject to strain and service. In spindle power and strength of feed this machine is unexcelled.

Facility of Manipulation.—The means for adjusting and operating the machine are so located and contrived as to consume the least possible time of the operator. The shaft for vertical motion is placed at an oblique angle and carries a clutch crank. This arrangement of shaft, in connection with permanent handles on screws for cross and longitudinal adjustment of table, gives the operator control of every adjustment without the necessity of changing his position or shifting handles.



IMPROVED No. 3 CINCINNATI UNIVERSAL TOOL ROOM MILLING MACHINE.

General Description Continued.

TWO adjustments may be made simultaneously. All adjustments are indicated in thousandths of an inch by large readable dials. The table is provided with a quick return. The cylindrical overhanging arm is used on all machines.

Its advantages of quick removal and adjustment are evident. It is made of ample diameter, and when in position is rigidly clamped at two points. It is provided with an adjustable phosphor bronze bushing, forming a perfect cylindrical support for the end of cutter arbor. The arbor is withdrawn by forcing the nut on it against the end of spindle.

Feed Variation.—Heretofore the variation in the feed of milling machines has been insufficient. In these machines, through a very simple mechanism at the back end of spindle, twelve distinct changes in the feed (progressing uniformly) are obtained for every spindle speed. A pointer on the end of lever shown indicates on a dial the feed at which the machine is being operated. Throwing this lever from one side to the other has the effect of doubling the feed or reducing it by one-half, an advantage in taking, roughing, and finishing cuts, etc. No belts or pulleys need be removed to effect these changes. The feed pulleys are of large diameter, and one and a half inch wide belts are used. On the coarse feeds the driving power is greatest.

Automatic Feeds.—These machines not only have an automatic longitudinal feed to table, but also an automatic cross motion in line with spindle. An automatic vertical feed is supplied to order. All feeds are started, stopped or reversed by levers conveniently located and operated from front of machine. In the larger machines, to facilitate adjustment by hand, the screw for vertical motion is provided anti-friction bearings.

The Universal Indexing and Dividing Head has a number of new features and improvements. It is distinctly universal, as the swiveling block carrying the spindle makes a complete revolution. This is an important feature and of great advantage on certain classes of work. In starting a cutter on work held at an angle, such as bevel wheels, etc., it has been a difficult matter to prevent gouging of the cutter. This difficulty is entirely overcome in these machines by swinging spindle over to the opposite side, thereby changing the character of the cut. With the work held in this position, heavier cuts may be taken and a smoother finish obtained. Right and left hand work may be cut without changing the cutters. The spindle is firmly held at any angle, ample means being provided for locking it rigidly in any position. The block carrying the spindle is always fully contained within its bearings, no matter at what angle the spindle is held. There is also a device for locking the spindle during cutting operation, to relieve all parts from unnecessary wear. The universal heads furnished have an extra cup-shaped dial plate for rapid indexing. The tail-stock has the patent adjustable center bar, on one end of which is a full round center, and on the other a center with the top milled off. The center bar is raised and lowered by means of rack and pinion for taper work. The universal head is provided with a complete set of change gears, and all necessary spirals right and left hand are cut automatically and divisions made up to three hundred and sixty. Everything shown in cut, including double friction countershaft, is furnished.

SPECIFICATIONS.

Net weight	-	-	-	-	-	-	-	2800 pounds
Shipping weight, about,	-	-	-	-	-	-	-	3100 pounds
Length of automatic feed to table,	-	-	-	-	-	-	-	27 inches
Cross motion in line with spindle,	-	-	-	-	-	-	-	7½ inches
Vertical range,	-	-	-	-	-	-	-	19 inches
Size of table over all,	-	-	-	-	-	-	-	46 x 9½ inches
Working surface of table,	-	-	-	-	-	-	-	43 x 9½ inches
Index centers swing,	-	-	-	-	-	-	-	12 inches
Index centers taken in length,	-	-	-	-	-	-	-	21 inches
Largest diameter of driving pulley,	-	-	-	-	-	-	-	11½ inches
Number of steps on driving pulley,	-	-	-	-	-	-	-	4
Width of driving belt,	-	-	-	-	-	-	-	3 inches
Number of feed changes,	-	-	-	-	-	-	-	12
Variations in feed to 1 revolution of spindle,	-	-	-	-	-	-	-	.006 to .150
Width of feed belt,	-	-	-	-	-	-	-	1½ inches
Center of spindle to overhanging arm,	-	-	-	-	-	-	-	6½ inches
Diameter of overhanging arm,	-	-	-	-	-	-	-	4½ inches



NO. 2 PUTNAM UNIVERSAL MILLING MACHINE.

WITH COUNTER BALANCED TABLE.

For Illustration of this Machine see Photo.

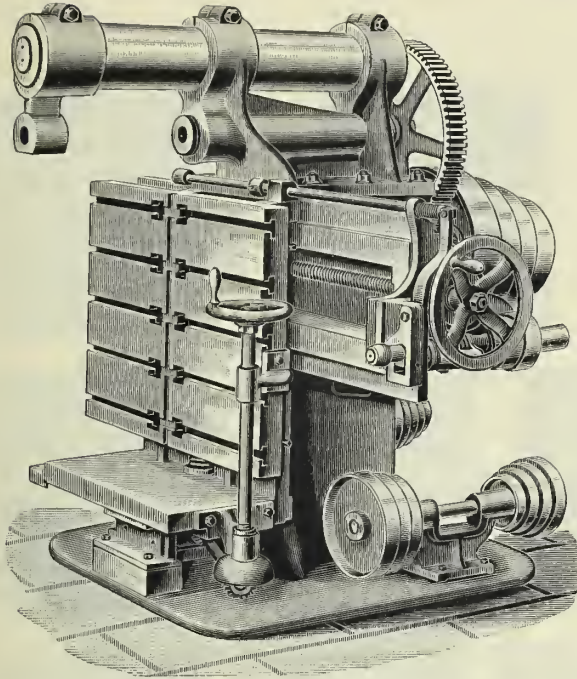
THIS MACHINE has all the movements of a plain milling machine, and in addition the work is automatically fed at an angle to the axis of the main spindle, and also automatically stopped at any desired point. The machine is strongly back geared. The overhanging arm, which carries an adjustable center, is easily clamped in any position, and can be run back out of the way when not needed. Driving cone has four shifts for wide belt. Head-stock gears are powerful. Speeds are proportioned to give velocities in uniform progression. Live spindle is made from a high grade of crucible steel; is hollow from end to end. Journals are ground by a special process to secure accuracy. Spindle boxes are interchangeable and easily duplicated, are made from one piece of anti-friction metal, are susceptible of accurate and easy adjustment, and preserve the original alignment of the live and dead centers. The beam sliding on the frame can be moved vertically a distance of 17 inches, while the table on this beam has a movement of $9\frac{1}{2}$ inches parallel with the axis of the main spindle. The movement of both beam and table can be made to thousandths of an inch. The platen has centers which swing 10 inches and take 20 inches in length, and on these, drills, taps, reamers, etc., can be held while milling straight or spiral, right or left hand. The screw operating the platen has a balance handle at both ends, allowing the operator to feed work by hand, if desired, from either side of the machine. The elevating head on platen is graduated, and can be set at any angle from 5 degrees below a horizontal to a perpendicular position, thus allowing bevel gears, angular mills, etc., to be cut. The spindle in this head is made hollow and fitted for a chuck, so that work can be held which is too long to be taken between centers. As this spindle and the main spindle are reamed to the same taper, the same arbor can be used in each. The machine has a tool shelf on rear side, adjustable oil tank with stop-cock, a set of change gears for different spirals, three index plates, a 6 inch three-jawed chuck, hand-wheel wrenches, and a vise with jaws 5 inches wide, 1 inch deep, and opening $3\frac{3}{8}$ inches. The vise swivels upon the platen at any horizontal angle; has graduated base. The frame of the machine is hollow and fitted with doors, thus forming closets for holding tools, etc.

Countershaft has two 12 inch friction pulleys for $4\frac{1}{2}$ inch straight and cross belt, to reverse machine, and should make 100 revolutions per minute. Floor space, 55 x 55 inches.

Weight, 2850 pounds.

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FIG. 116.



STANDARD MILLING MACHINE.

THIS MACHINE has vertical table, 20 inch cross feed, vertical adjustment of 6 inches. Arm 4 inches diameter, cone pulley 11 inches to 18 inches diameter, for $3\frac{1}{2}$ inch belt, geared 4 to 1. Spindle 3 inches diameter, main gear 20 inches diameter. Weight, 5500 pounds.

The description of the general construction of the Heavy Standard as given below, applies also to this machine.

HEAVY STANDARD MILLING MACHINE.

THIS MACHINE is intended for general machine shop use, but on larger work requiring larger cutters and taking deeper cuts than usually attempted on Milling Machines of its type.

The Head is 32 inches long, has a horizontal movement of 3 inches on top of standard for the cross adjustment of cutters, thus dispensing with one joint below the table, and has an overhanging arm 8 inches diameter, which is removed for the use of cutters over 12 inches diameter.

The Spindle is of steel and runs in bronze boxes. The front bearing is conical, $6\frac{1}{2}$ inches diameter. Has threaded end for face cutters and taper hole for cutter arbors. It is driven by a cone with four sections; the larger 20 inches diameter for a $3\frac{1}{2}$ inch belt through gearing in the ratio of 16 to 1. The spindle gear is 30 inches diameter, $3\frac{1}{2}$ inches face.

The Table is 14 inches wide, 72 inches long. At the lowest position the top is 24 inches below the center of the spindle. It has a bearing in the knee 14 inches wide, 48 inches long.

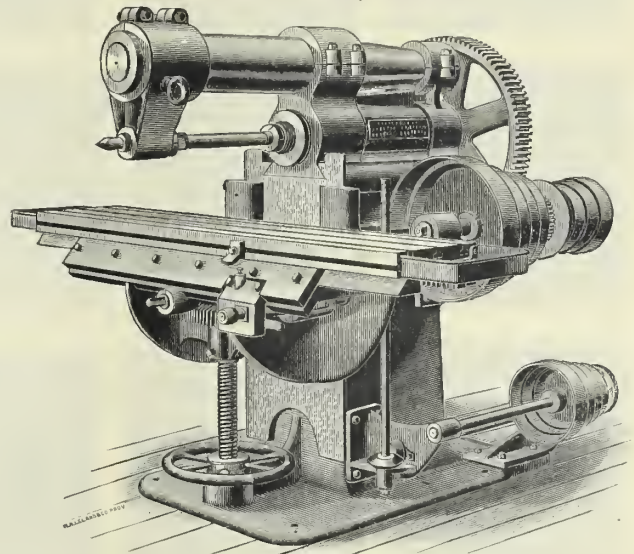
The Knee has bearing on standard 20 inches wide, 26 inches long, and is supported by elevating screw $2\frac{1}{2}$ inches diameter. The hand wheel nut rests on hardened steel balls.

The Feed is the full length of the table and driven by a $2\frac{1}{2}$ inch belt on a four section cone, and in connection with intermediate gearing, twenty changes of feed can be obtained, so that the maximum rate of feed per minute of the table can be maintained irrespective of the diameter of cutter used and proportionate spindle speed. This is a very desirable feature, as it is frequently required that the rate of feed per minute of the table should be greater when using a cutter of large diameter, and consequently slow spindle speed, than when using a cutter of small diameter and fast spindle speed.

The Countershaft has tight and loose pulleys 16 inches and 20 inches diameter, and should run 250 and 90 turns per minute respectively. Floor space required, 80 x 160 inches. The base is 36 x 54 inches. Height, 67 inches. Center of spindle, 50 inches above floor. Weight, 8000 pounds.

Extra Attachments. An automatic vertical feed for knee can be furnished, also a vertical spindle milling attachment.

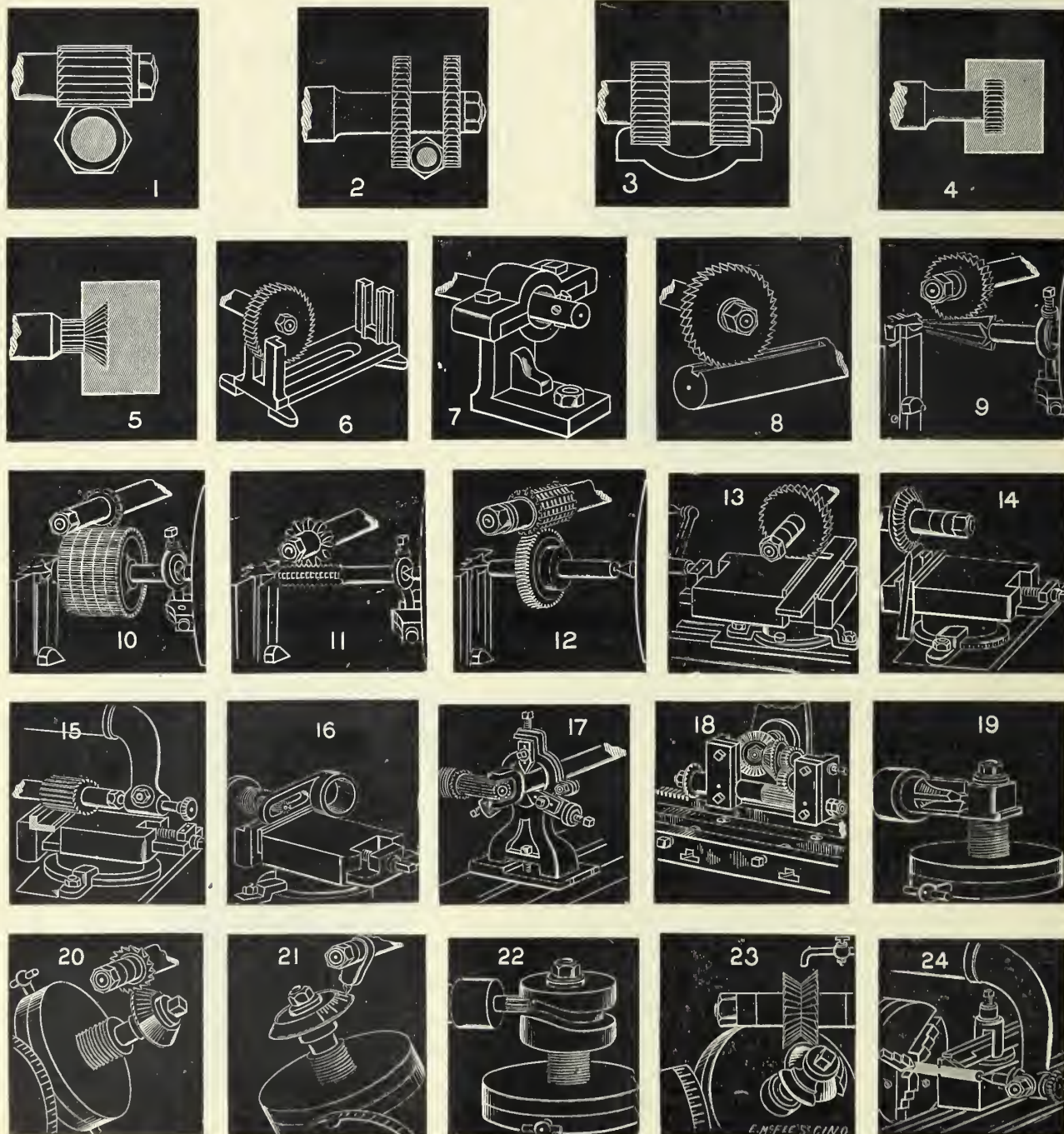
FIG. 117.



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CINCINNATI MILLING MACHINE OPERATIONS.

FIG. 118.





CINCINNATI MILLING MACHINE OPERATIONS.

Explanation of Cuts on Opposite Page.

FIGURE 1 illustrates how hexagon nuts or heads of bolts can be milled with a single cutter.

Fig. 2. How to mill a number of nuts at a time, with two cutters, while strung on a mandrel.

Fig. 3. How to mill a lot of caps, accurately finishing the sides and bottom at the same time.

Fig. 4. How to mill a T slot having groove milled or planed to proper depth.

Fig. 5. How to mill a V slot.

Fig. 6. How to mill the guides of a housing. This can be done with a cutter the width of guide, or with a saw about $\frac{1}{4}$ inch thick, finishing one side, and then the other. A small cutter should then be applied to finish inside bearings. The housing requires but one chucking.

Fig. 7. How to turn out a hole with a boring bar arbor. Various work can be drilled and bored out to an advantage in this way, by either bolting the work on the table, holding it in a vise or between centers.

Fig. 8. How to mill a key seat. Can be done in a vise or between centers.

Fig. 9. How to mill a taper reamer.

Fig. 10. How to cut a number of gear wheels when strung on a mandrel.

Fig. 11. How to mill a tap.

Fig. 12. How to hob a worm wheel after the teeth are cut. This operation gives the teeth the proper shape, so that the shafts will stand at right angles to each other.

Fig. 13. How to cut off pieces of metal.

Fig. 14. How to mill a thread chasing tool. The milling cutter is to be V shaped and 60 degrees. Mill one side first, and then the other, without re-chucking.

Fig. 15. How to mill an angle, finishing sides and bottoms at the same time.

Fig. 16. How to mill a slot with a small cutter.

Fig. 17. How to mill a fork true with its round shank. One end is held in a universal chuck, which is screwed on the spindle of the indexing center, and the other held in a steady rest.

Fig. 18. How to cut a rack.

Fig. 19. How to mill boxes perfectly true with the hole.

Fig. 20. How to mill an angular cutter.

Fig. 21. How to index dial plates. In this case the tool does not revolve.

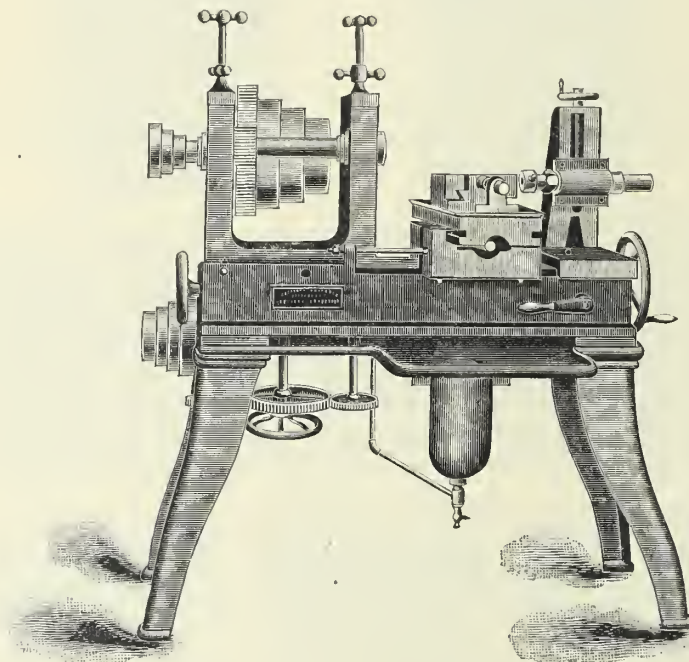
Fig. 22. How to mill a cam.

Fig. 23. How to mill a friezing bit for wood work. First, the sections are milled out with a square faced cutter, and then the cutting edges are milled by placing a right and left angular cutter on the milling arbor. These bits can be milled complete before removing them from the mandrel.

Fig. 24. How to cut off round or square stock by placing the universal chuck on the main spindle and using the overhanging arm for a length gauge.

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FIG. 119



LINCOLN PATTERN MILLING MACHINE,

WITH OIL PAN AND TANK.

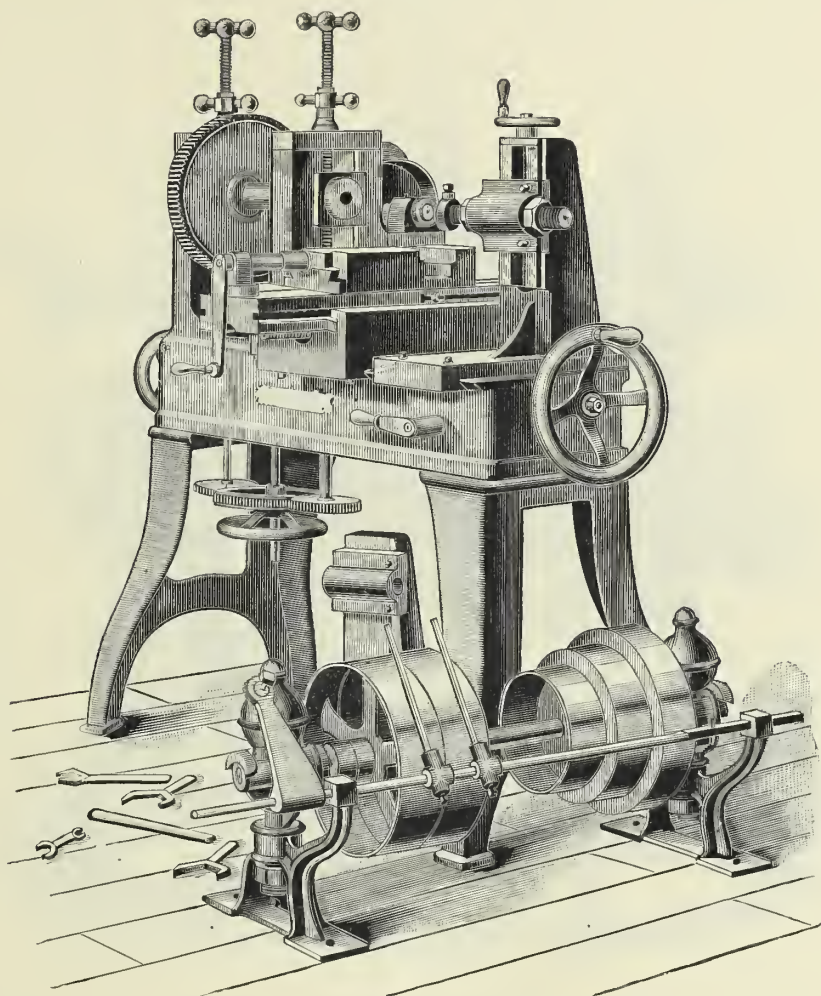
THIS MACHINE is furnished with an adjustable tail-stock which can be quickly and easily set at any part of the bed. It has self-acting screw feed, with an adjustable automatic stop motion, three changes for feed belt and three for driving belt. Back geared $4\frac{1}{2}$ to one. It is also provided with oil pan and tank for filtering oil from chips and shavings; this is a valuable feature not found on other machines.

SPECIFICATIONS.

Greatest height of spindle above carriage, $8\frac{1}{4}$ inches. Length of cross feed, $14\frac{1}{2}$ inches. Length of lateral feed, 6 inches. Length of cross feed slide, 28 inches. Width of cross feed slide, $7\frac{1}{2}$ inches. Size of taper hole in spindle, $1\frac{1}{4}$ inches. Greatest distance between centers, 16 inches. Center of spindle to bottom of vise, 6 inches. Speed of countershaft, 300 revolutions per minute. Pulley on countershaft, 12 inches diameter for 3 inch belt; cone, 12, 10 and 8 inches diameter. Main spindle, large bearing, $2\frac{1}{4}$ inches diameter; small bearing, $1\frac{3}{4}$ inches diameter. Weight, with tail stock and countershaft, 1300 pounds.

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FIG. 120.

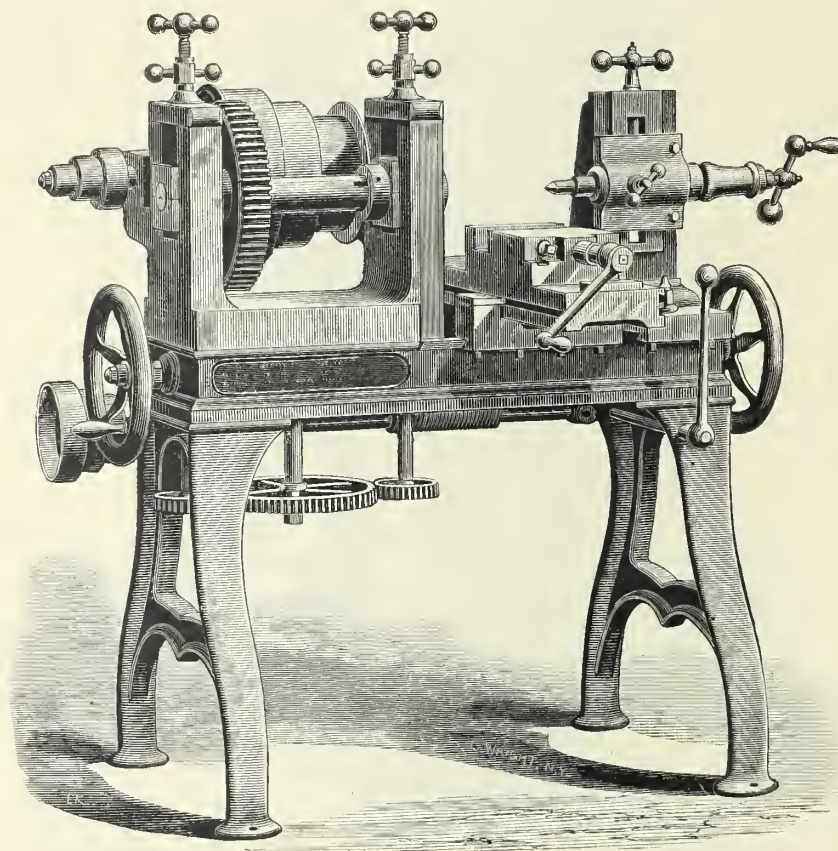


LINCOLN PATTERN MILLING MACHINE.

THIS MACHINE is furnished with an adjustable tailstock, which can be quickly and easily set at any part of the bed. The table is 28 inches long x $7\frac{1}{2}$ inches wide; it has an adjustment of 6 inches to and from the head, and is operated by a lead screw. The spindle has standard taper $1\frac{1}{4}$ inches diameter, and 6 inches deep. The machine is back geared $4\frac{1}{2}$ to 1. Greatest distance between centers, 16 inches. Greatest height of spindle above carriage, $8\frac{1}{4}$ inches. Distance from center of spindle to bottom of vise, 6 inches. Pulleys on countershaft, 12 inches diameter for 3 inch belt. Speed of countershaft, 300 revolutions per minute. Weight complete, 1350 pounds. Machine can be furnished without either vise or tailstock if desired.

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FIG. 121.



No. 2 LINCOLN PATTERN MILLING MACHINE.

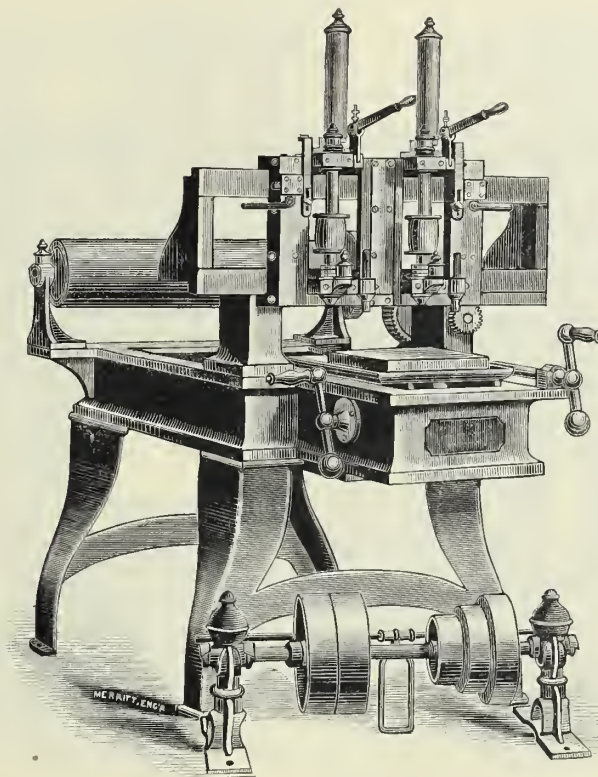
THIS MACHINE is designed for bicycle and gun work, sewing machines, etc. It is provided with hand or power feed, countershaft, hangers, etc. Weight, 1750 pounds.

No. 3 Milling Machine.—This machine is designed for bicycle and gun work, sewing machine manufacturing, etc. It has hand or power feed, countershaft, hangers and wrenches. Weight, 1800 pounds.

No. 4 Milling Machine.—This machine is designed for gun work and heavy milling. Has hand or power feed, is double geared and extra heavy. Weight, 1925 pounds.

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FIG. 122.



2 SPINDLE EDGE MILLING MACHINE.

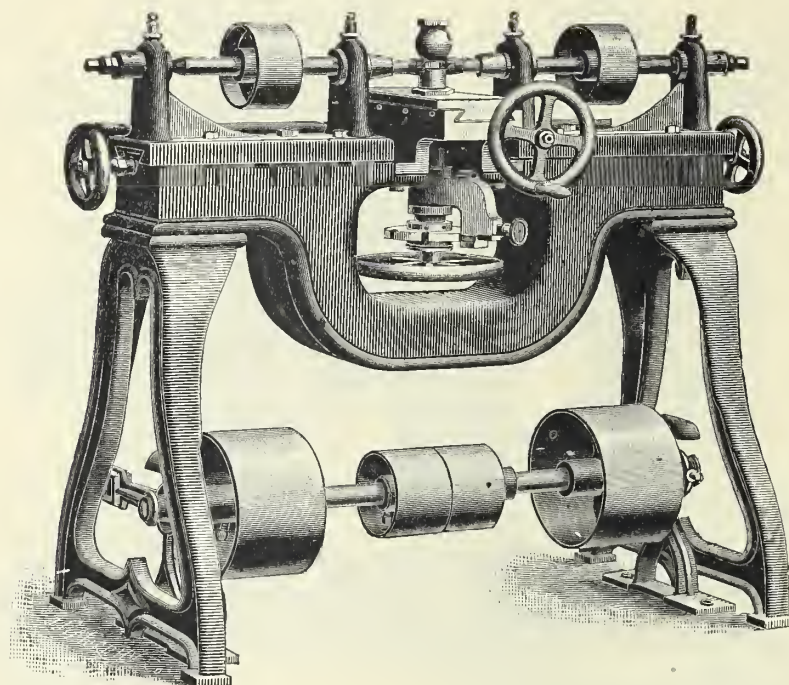
THIS MACHINE is especially adapted for Bicycle, Gun, and Sewing Machine manufacturers. It is built from entirely new patterns, has take up for wear in back and gears, and is constructed from the best material with the utmost care to ensure good workmanship and correct results.

SPECIFICATIONS.

Speed of countershaft, 300 revolutions. Tight and loose pulleys, 10 inches diameter, $2\frac{1}{4}$ inch face. Spindle and guide pin, $4\frac{1}{8}$ inches apart. Taper in spindle, $\frac{5}{8}$ inch to $\frac{3}{4}$ inch (standard size). Lower bearing of spindle, $1\frac{1}{2}$ inches; upper bearing, $1\frac{1}{4}$ inches. Pulley on spindles, 4 inches. Diameter, $4\frac{1}{2}$ inch face. Table, 12 x 15 inches. Guide pin held by clamp; size of pin, .833. Finished weight of machine and countershaft, 2600 pounds.

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FIG. 123.



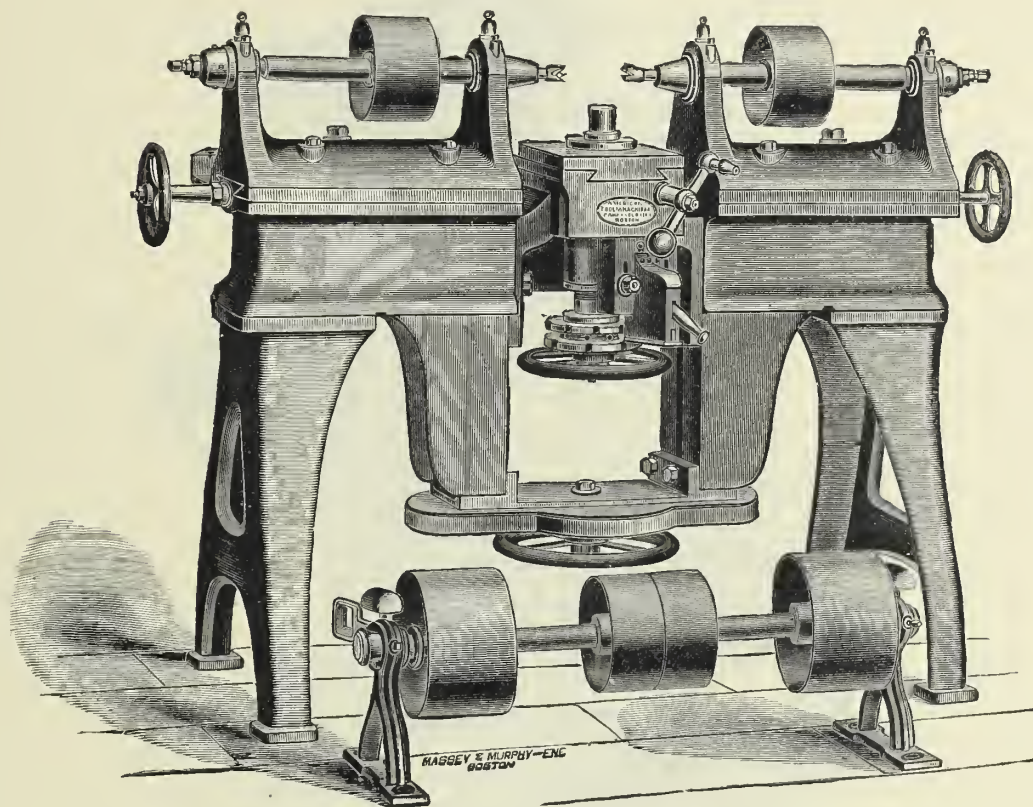
No. 1 VALVE MILLING MACHINE.

SPECIFICATIONS.

This machine is $5\frac{1}{8}$ inches between cutters, and $3\frac{1}{2}$ inches from top of elevating spindle to centre of cutters.
Pulleys on spindles, 6 inches diameter by 3 inch face.
Speed of countershaft 500 revolutions per minute.
Tight and loose pulleys on countershaft, 6 inches diameter by 3 inch face.
Driving pulley on countershaft, 10 inches diameter by 6 inch face.
Floor space, 3 feet 9 inches by 2 feet 1 inch.
Shipping weight, 800 pounds.

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FIG. 124.



No. 0 VALVE MILLING MACHINE.

SPECIFICATIONS.

THIS MACHINE is 13 inches between cutters, and 10 inches from top of elevating spindle to center of cutters.

Pulleys on spindles are 7 inches diameter by 4 inch face.

Speed of countershaft, 500 revolutions per minute.

Tight and loose pulleys on countershaft, 8 inches diameter by 4 inch face.

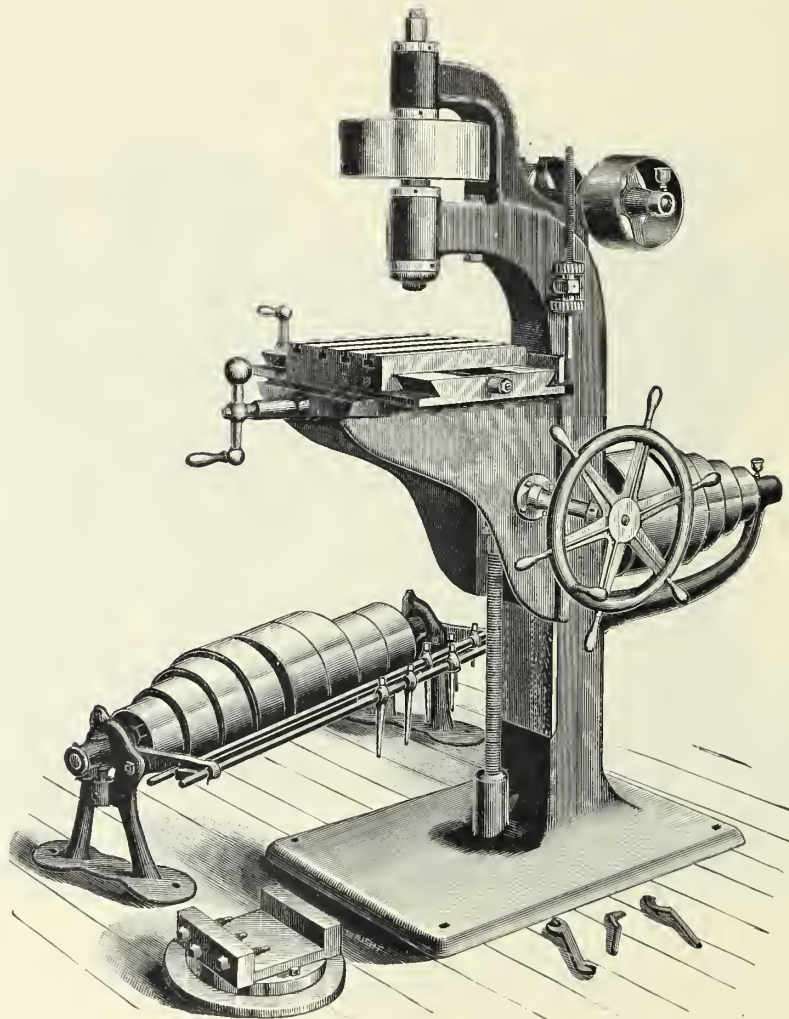
Driving pulley on countershaft, 12 inches diameter by 10 inch face.

Floor space, 5 feet 4 inches by 2 feet 10 inches.

Shipping weight, 1335 pounds.

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FIG. 125.



IMPROVED No. 1 VERTICAL MILLING MACHINE OR DIE SINKER.

THIS MACHINE is made from new and improved patterns, with extra heavy bearings and surfaces. The surfaces are all scraped to surface plates. Height of machine is 6 feet 3 inches. Table is 14 x 14 inches, with four $\frac{5}{8}$ inch T slots, and vertical movement of $15\frac{1}{2}$ inches. This movement is indicated by a graduated dial on the pilot wheel to 256th part of an inch. The knee rests on ball bearings, with hardened steel bushings, making a great improvement in operating the vertical movement. The cross movements are 17 and 12 inches respectively. The feed screws for handling the cross movements have adjustable nuts for taking up wear. The main spindle bearing is $1\frac{1}{8}$ inches diameter and $6\frac{1}{2}$ inches long. The lower end of spindle is bored out to No. 2 taper, and a shell chuck, with straight hole for holding straight shank tools $\frac{3}{4}$ x $1\frac{3}{4}$ inches, is fitted in same. This chuck is made in two pieces which pass entirely through the spindle, and is operated at the top of spindle by a right and left hand screw which draws the chuck or forces it out. This chuck always runs true and holds the tools perfectly rigid. It is simple, strong and reliable, never getting loose or allowing the tools to drop down.

The main spindle is driven by a 12 inch pulley with $4\frac{1}{2}$ inch face. The cone pulleys have 4 steps ranging from $5\frac{1}{2}$ to 12 inches, requiring a $3\frac{1}{2}$ inch belt, and are driven by a countershaft having two sets of tight and loose pulleys 10 x 5 and 12 x 5 inches respectively, making eight changes of speed, and giving a range of from 62 to 654 revolutions on the spindle.

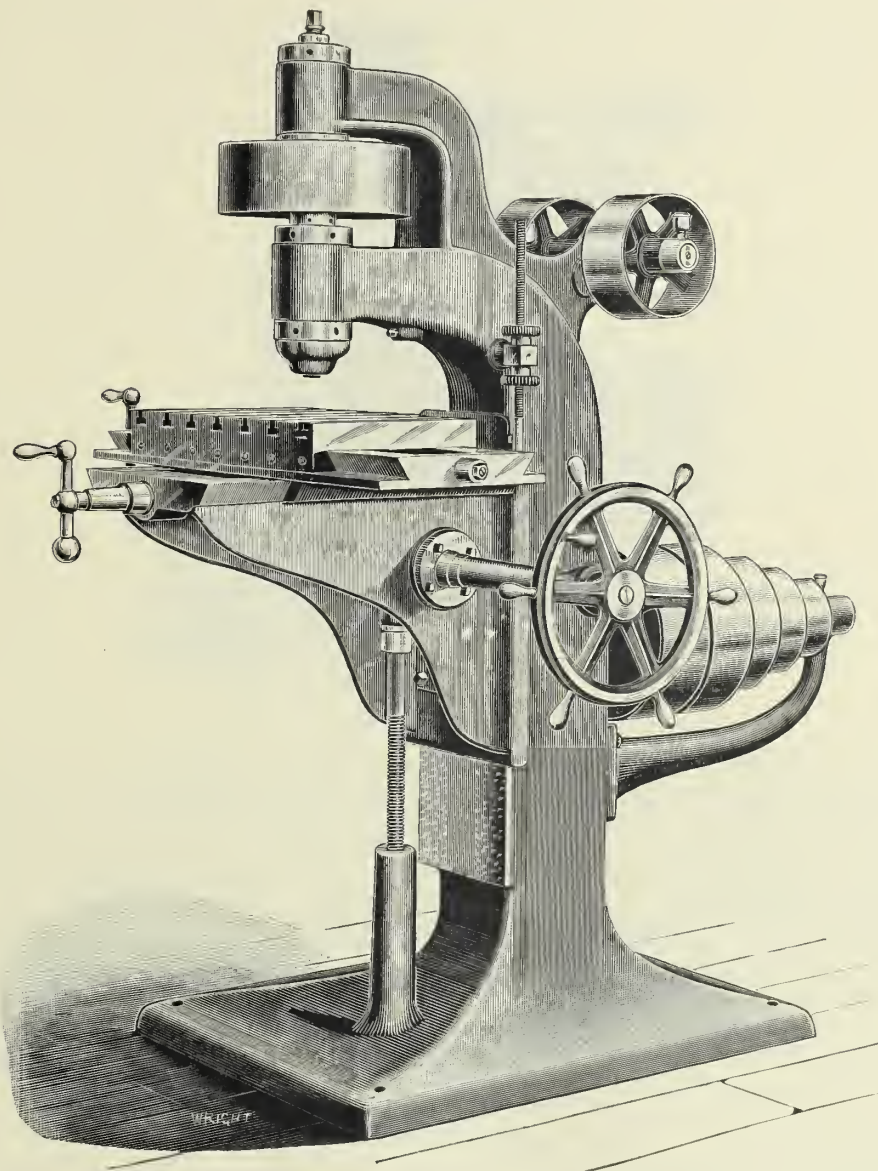
The speed of the countershaft on 12 inch pulley is 135 revolutions, on the 10 inch pulley 300 revolutions per minute.

Floor space is 3 feet 7 inches by 5 feet 8 inches. Weight, with countershaft, 2200 pounds.

We furnish with this machine either flat or circular feed vise at slight extra cost.

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FIG. 126.



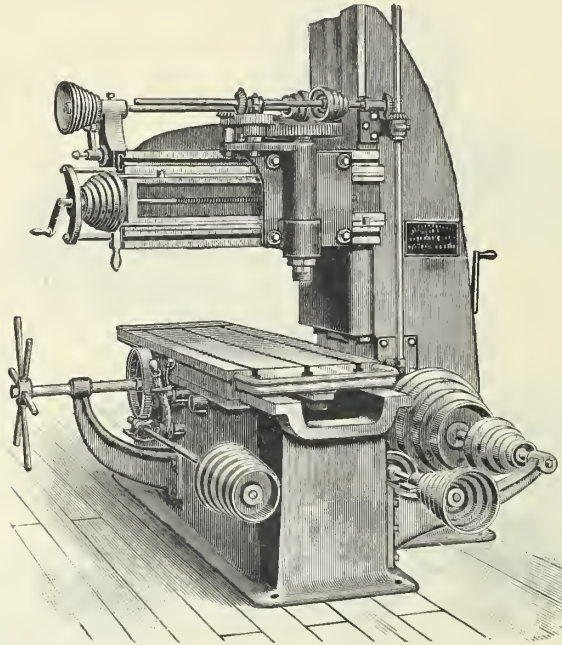
IMPROVED No. 2 VERTICAL MILLING MACHINE OR DIE SINKER.

THIS MACHINE is made from new and improved patterns, with extra heavy bearings and surfaces. The surfaces are all scraped to surface plates. Height of machine is 6 feet 7 inches. Table, 14 x 24 inches, with seven $\frac{3}{8}$ inch T slots with vertical movement of 16 inches. This movement is indicated by a graduated dial on the pilot wheel to 250th part of an inch. The knee rests on ball bearings with hardened steel bushings, making a great improvement in operating the vertical movement. Cross movements are 24 and 14 inches respectively. The feed screws for handling the cross movements have adjustable nuts for taking up the wear. The main spindle bearing is $2\frac{1}{2}$ inches diameter and 8 inches long. The lower end of spindle is bored out to No. 10 taper; a shell chuck, with straight hole for holding straight shank tools $\frac{3}{8}$ x 2 inches, is fitted in same. It is made in two pieces which pass entirely through the spindle, and are operated at the top of spindle by a right and left hand screw which draws the chuck in or forces it out. This chuck always runs true and holds the tools perfectly rigid. It is simple, strong and reliable, never getting loose or allowing the tools to drop down.

The main spindle is driven by a 14 inch pulley with a 5 inch face. The cone pulleys have 4 steps, ranging from $6\frac{1}{2}$ to 14 inches, requiring a 4 inch belt, and are driven by a countershaft having two sets of tight and loose pulleys, 10 x 6 and 12 x 6 inches respectively, making 8 changes of speed and giving a range of from 63 to 646 revolutions on the spindle. The speed of the countershaft on 12 inch pulley is 135 revolutions; on 10 inch pulley is 300 revolutions. Floor space, 5 feet x 6 feet 6 inches. Weight of machine with countershaft, about 2600 pounds. We furnish with this machine either flat or circular feed vise at slight extra cost.

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FIG. 127.



VERTICAL SPINDLE MILLING MACHINE.

THIS MACHINE is designed for surface milling, using face or end cutters from 1 inch to 12 inches diameter.

The Bed is heavy and well stiffened with girts and calculated to absorb all vibrations.

The Upright is firmly attached to the bed, is of box pattern 8 inches high, 24 inches wide, and so constructed as to best withstand torsional strains and vibrations.

Table is 24 inches wide, 96 inches long. Pans project from each end to protect bearings on bed which are flat and to which it is firmly gibbed. There are three T slots running its entire length.

Cross Head has a bearing on upright of 24 inches wide, 48 inches long, and is well braced to resist action of cutter. It is adjusted by means of a screw geared down to a hand crank provided with graduated dial reading $\frac{1}{1000}$ inches.

Saddle which carries the spindle is securely gibbed to the cross head on which it has a movement of 24 inches at right angles to that of the table.

Spindle is of hammered steel and runs in hard bronze boxes; the lower one is conical, 4 inches diameter, 5 inches long. It is driven by a $3\frac{1}{2}$ inch belt on a 4 section cone through gearing in the ratio of $6\frac{2}{3}$ to 1 with compound $16\frac{1}{2}$ to 1, calculated to give proper speeds for cutters ranging from 1 inch to 12 inches diameter.

Feed is by hand or power the full length of table, and is provided with automatic stop. There are 12 changes from 1 inch to 8 inches per minute, regardless of diameter of cutter.

Countershaft has tight and loose pulleys 16 inches diameter for $4\frac{1}{2}$ inch belt, and should run 340 revolutions per minute. Weight, 16800 pounds.

Illustration shows power cross-feed. These machines are furnished with it or without.

VERTICAL SPINDLE MILLING MACHINE,

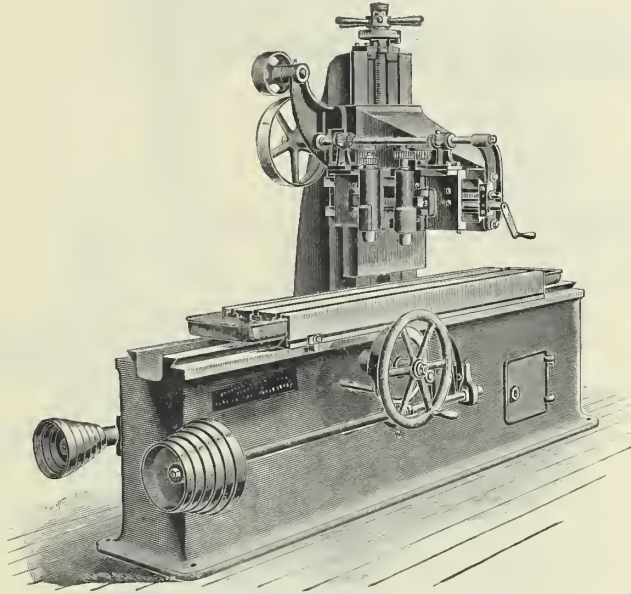
WITH DOUBLE HEAD AND OUTER SUPPORT.

This machine is identical with the above, excepting that it is provided with double head and outer support. Spindles can be run independently or together. Each has independent vertical and horizontal adjustment. 16-inch face mills can be used.

The design of these machines will be changed if desired to conform to any requirement.

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FIG. 128.



VERTICAL TWO-SPINDLE MILLING MACHINE.

THIS MACHINE consists of a box bed 9 feet long, with extension on back supporting the upright which carries the overhanging arm, to which is fitted the two saddles carrying the spindles.

The spindles are made with $1\frac{1}{2}$ inch diameter conical bearing at lower end, and $1\frac{1}{8}$ inch straight bearing at upper end, each provided with bronze bushings. The spindle ends extend 2 inches below spindle head. The cross adjustment of the spindle centers are from $2\frac{1}{2}$ inches to 14 inches. Each spindle is provided with $\frac{1}{2}$ inch independent vertical adjustment. The vertical adjustment of cross head on upright is by means of a screw, and is provided with a dial to read to thousandths of an inch. The spindles can be raised from platen to $17\frac{1}{2}$ inches above.

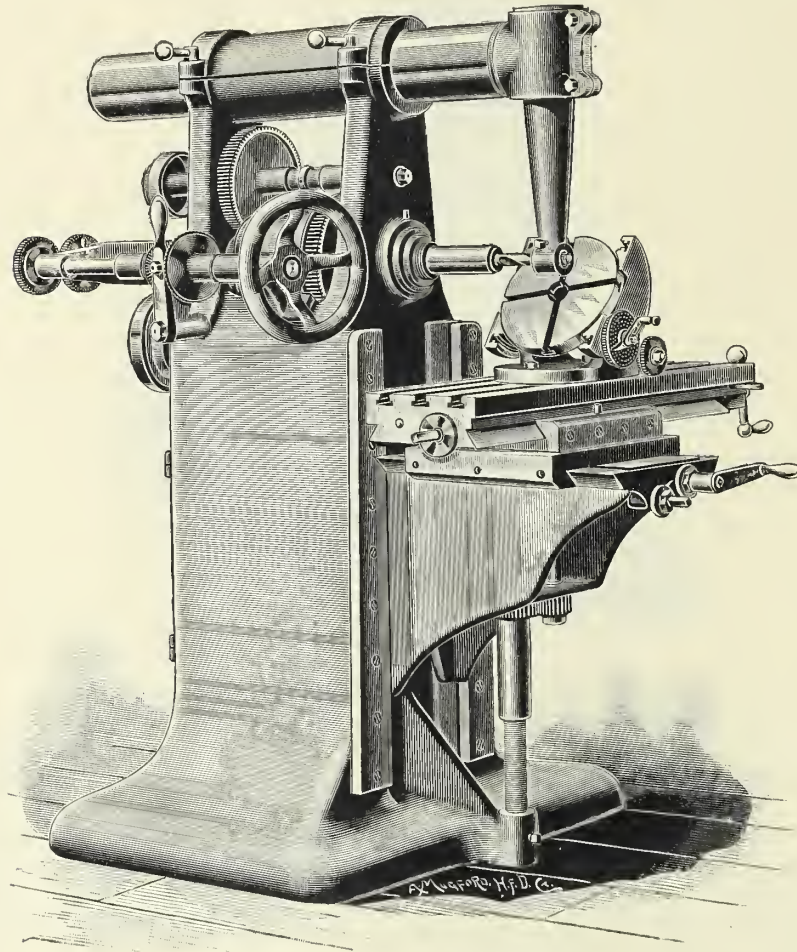
The belt which drives the spindles also drives the feed mechanism, and is so arranged that the tension of driving belt is not altered by the vertical movement of cross head on upright.

SPECIFICATIONS.

Platen is 6 feet long inside of end pans, 14 inches wide and 5 inches deep. Feed is 6 feet 4 inches, by hand or power, provided with automatic stop, and has 12 changes from 1 inch to 16 inches per minute at some speeds, but 2 inches to $8\frac{1}{2}$ inches per minute at any of the spindle speeds. Spindle adjustment is from $2\frac{1}{2}$ inches to 14 inches from center to center. Vertical adjustment is $\frac{1}{2}$ inch. Spindles have No. 3 Morse taper holes. Upright is 18 inches wide on face. Pulley on driving shaft of machine is 16 inches diameter for 3 inch belt. Cross head adjustment on upright moves spindles from 0 to $17\frac{1}{2}$ inches above platen. There are two countershafts, the first to run 210 revolutions per minute. Extreme height of machine, 7 feet. Weight about 8000 pounds.

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FIG. 129.



COMBINED MILLING AND BORING MACHINE.

THE above illustrated machine represents a Full Universal Milling Machine of unusual capacity with three new and important features:

FIRST.—A sliding bar or telescoping spindle lying inside of the main spindle and revolving with it, which carries any kind of cutting tool in either direction automatically or by hand feed into the work set rigidly on the machine.

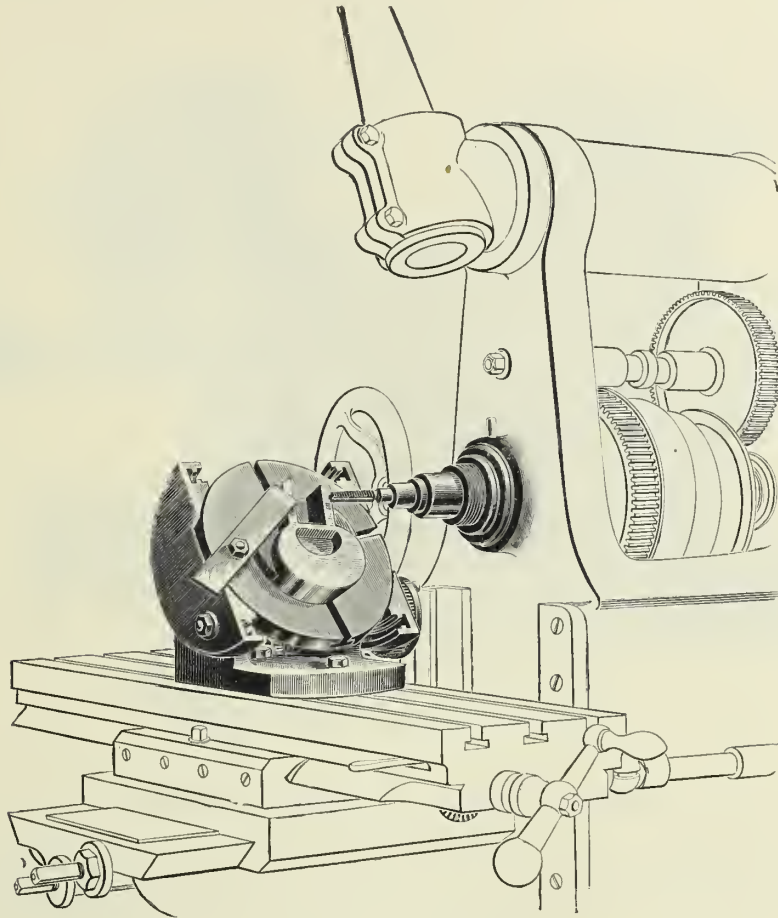
SECOND.—An adjustable pendant, constituting a perfect drill jig or carrier for boring bars and arbors, and an arm adjustable its entire length and which can be thrown out of the way entirely.

THIRD.—A combined work table, angle table, and dividing head with spiral adjustment. This attachment presents work for boring, milling, drilling, tapping, etc., in any possible position or angle from the horizontal to the perpendicular without taking the work from its original seat.

For other operations of this machine see page 142.

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FIG. 130.



COMBINED MILLING AND BORING MACHINE.

THE above cut illustrates two of the special features of these machines: The sliding bar or spindle, and the angle table.

The main spindle, which is 3 inches in diameter, is shown with a collar and end, threaded to take the screw arbors. Coming out from the inside and revolving with the main spindle, is seen the telescoping spindle $2\frac{1}{4}$ inches in diameter, and bored to No. 5 Morse taper, with a butt mill in its end. This sliding spindle, driven out and in automatically or by hand feed, has a travel of 13 inches with 9 inches bearing remaining in the main spindle, and as its only motion is sliding, wear is a minimum and alignment always true.

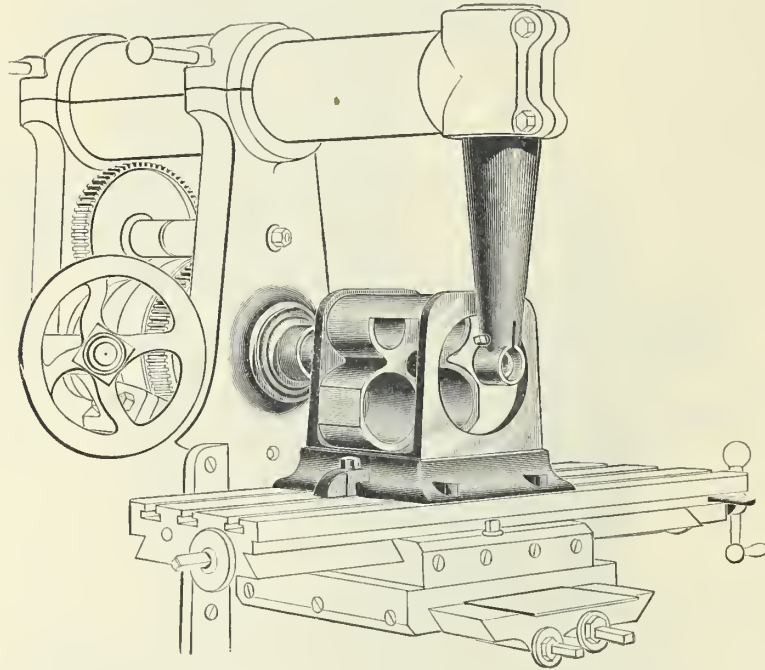
By putting a drill in the place of the butt mill and bringing the jig pendant down just over the point of the drill it will be seen that a true hole can be made in any work, whether flat, angular, or spherical. The same true results are obtained with a boring bar whose one end is in the sliding spindle and the other firmly held by the bushing in the jig pendant.

The angle table is illustrated as thrown at an angle of about 45 degrees with a piece strapped to it to show the circular face above all surrounding parts, allowing work of any size to be put on it; its cross T slots and how work can be fastened; its semi-circular sides, which can be set at any angle by graduations on the cheek, from the horizontal to the perpendicular; and how, by its construction, graduations on platen, saddle, and the index divisions work can be placed in any position or angle to the cutting tool without measurement or scratch.

For other operations of this machine see page 142.

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FIG. 131.



COMBINED MILLING AND BORING MACHINE.

TO clearly illustrate the working of this tool and the advantages of the combination of boring and milling in one machine, we show cut of work done on the frame of a double compound engine, whose four cylinders must be in perfect alignment with themselves and the central hole for the shaft of the circular valve whose seat is in the same casting at the back.

It will be seen that accuracy in all the operations of boring, drilling, facing, milling, etc., is absolutely necessary, and also how difficult and expensive the work would be in ordinary shop practice.

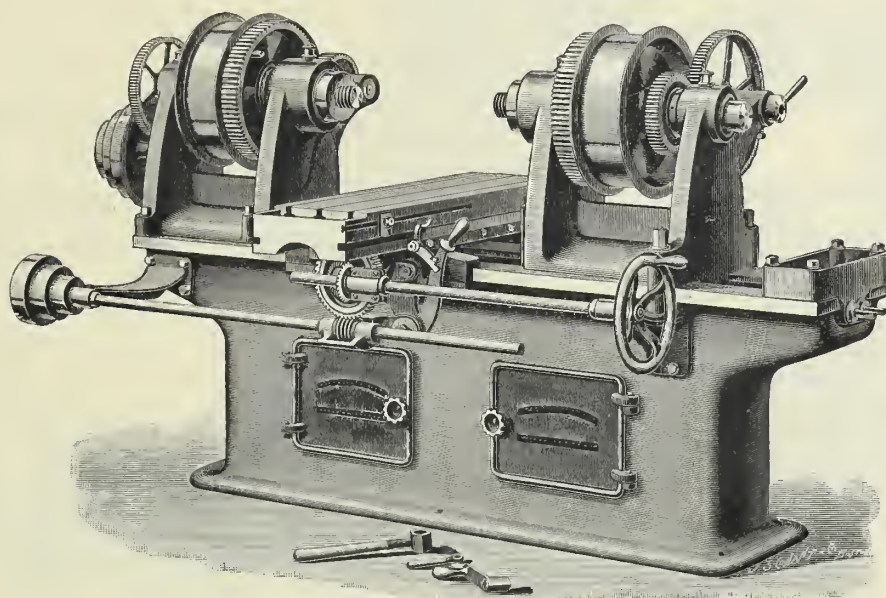
With this machine, after facing the bottoms, we clamp the work on the platen with the valve seat to the back, and it is not moved again until every one of the thirteen operations are completed and the work is finished.

Mechanics will see in a moment the economic advantages of this construction. The work never changes its first setting, while the telescoping spindle carrying butt mill, drill, or boring bar, travels out or back by power feed or hand, in a perfect line. The pendant, adjustable so that it can drop inside or outside of the work, holds the drill or boring bar close up to the cutting tool to avoid any chance of spring, with no laying out or measurements, the tool doing all its own. The result in accuracy of production and limit of cost is without comparison.

For other operations of this machine and illustrations see pages 140 and 141.

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FIG. 132.



No. 1 DUPLEX MILLING MACHINE.

THIS MACHINE is designed for manufacturing purposes, taking cuts on one side of two pieces, or on two sides of one piece at the same time, the article passing between the ends of the spindles and the work done by face mills, which produce the best results when the nature of the work will admit of their use. Milling Cutters of this character are the most economical to construct and maintain.

The Bed is eight feet long, 18 inches wide, 27 inches deep, and very heavy.

Heads.—There are two heads, one fixed, the other can be moved horizontally by means of a screw, to any desired position on the bed, and securely fastened.

The Spindles run in bronze boxes; the front bearing is $4\frac{7}{8}$ inches in diameter, 6 inches long, back bearing $3\frac{3}{8}$ inches diameter, 5 inches long. The greatest distance from end to end of spindles is 3 feet; least distance, 5 inches. The driving pulleys are 16 inches diameter for 5 inch belt. The back gearing is in the ratio of 8 to 1.

The Table has no vertical adjustment, the article to be operated on being held in a suitable fixture. The top has three T slots, and is 40 inches long, 14 inches wide, and has an automatic screw feed of 30 inches. The distance from center of spindles to top of table is 10 inches.

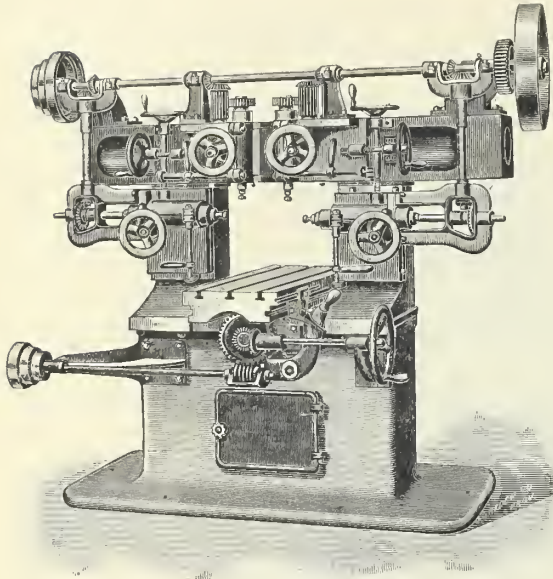
The Carriage is moved on the bed by a screw to the desired position, and then fastened.

Countershafts.—There are two countershafts, each having a three-section cone, giving six properly arranged speeds to the spindles. The first shaft has tight and loose pulleys 16 inches in diameter for a 5 inch belt, and should run about 120 turns per minute.

Weight, including two countershafts, 7500 pounds.

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FIG. 133.



FOUR SPINDLE MILLING MACHINE.

WE are prepared to furnish Milling Machines for special purposes. One or more spindles arranged in any manner to meet requirements.

HORIZONTAL SPINDLE MILLING MACHINE.

THIS MACHINE is intended for long and heavy cuts, such as guide bars, connecting rods, key seating shafting, axles to 10 inches diameter, etc., and is a very solid, substantial tool.

The Bed is heavy and well stiffened by a number of girts, making a firm support for the table and housings.

The Table is 14 inches wide, has three T slots and is 8 feet long, moves by cut rack and so geared as to be easily operated by hand, and is surrounded by a trough to collect lubricant used on cutters.

The Cross Head is gibbed to the housings and adjusted by a screw with graduated dial reading to thousandths, which facilitates accurate measurement for sinking and other cuts. The distance between housings is 19 inches.

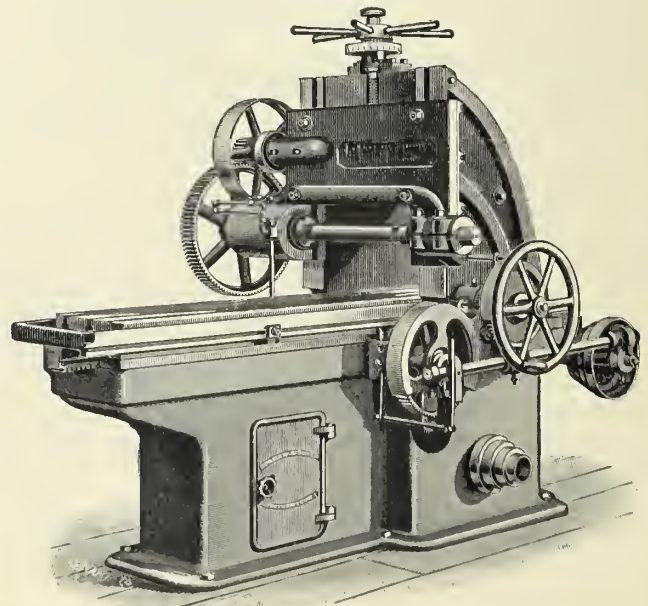
The Spindle runs in bronze bearings $4\frac{3}{8}$ inches diameter and $5\frac{1}{2}$ inches long; is driven by a $3\frac{1}{2}$ inch belt over a 20 inch pulley, through gearing in the ratio of 6 to 1, arranged for 3 speeds. Provision is made for horizontal adjustment of cutters, in addition to that afforded by washers. The greatest distance from top of table to center of spindle is 20 inches; the least, 3 inches. Cutters to $8\frac{1}{2}$ inches diameter can be used. Cutter section of spindle is $1\frac{3}{4}$ inches diameter, 14 inches long.

The Feed is actuated by means of a worm and gear driven by cones having four sections, and can be thrown out by hand as desired, or stopped automatically by adjustable stop, and is the full length of table. (Power elevating arrangement for cross head can be furnished.)

A Pump returns the lubricant to the cutters as collected in a tank contained in the bed.

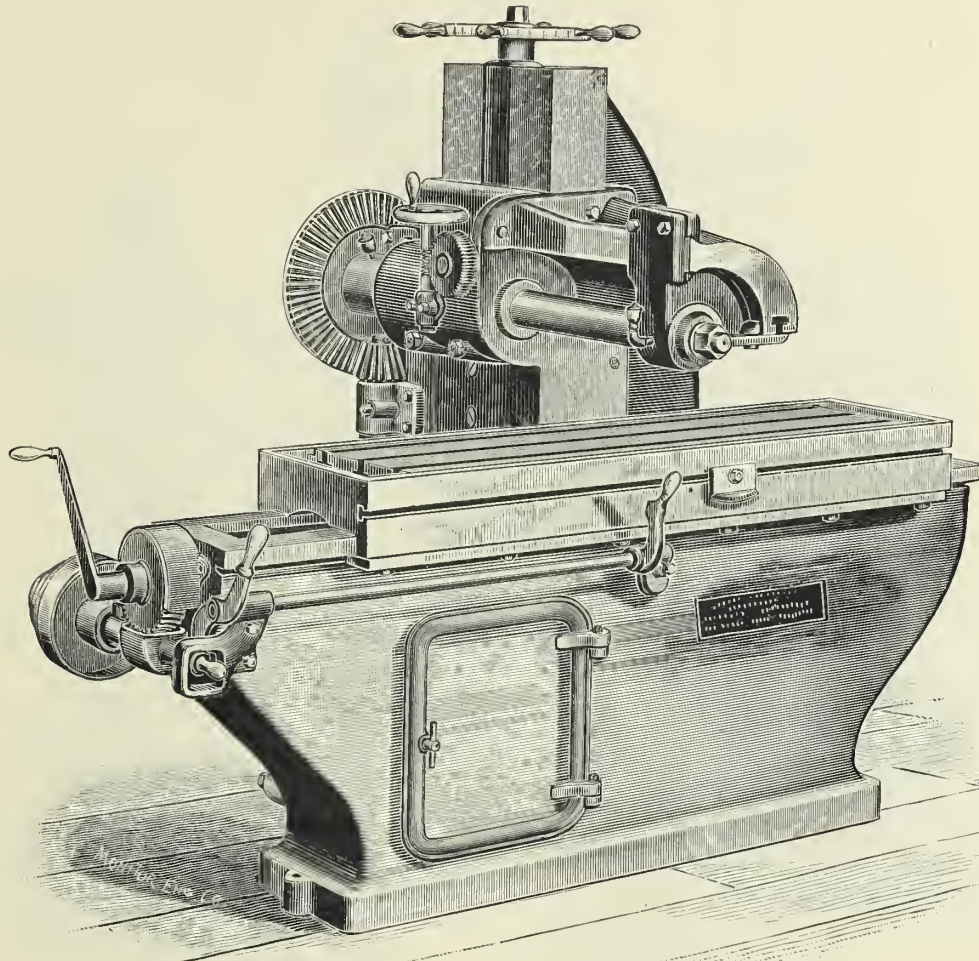
Countershaft has tight and loose pulleys 18 inches diameter for $4\frac{1}{2}$ inch belt, and should run 200 revolutions per minute. Weight, 8000 lbs.

FIG. 134.



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FIG. 135.

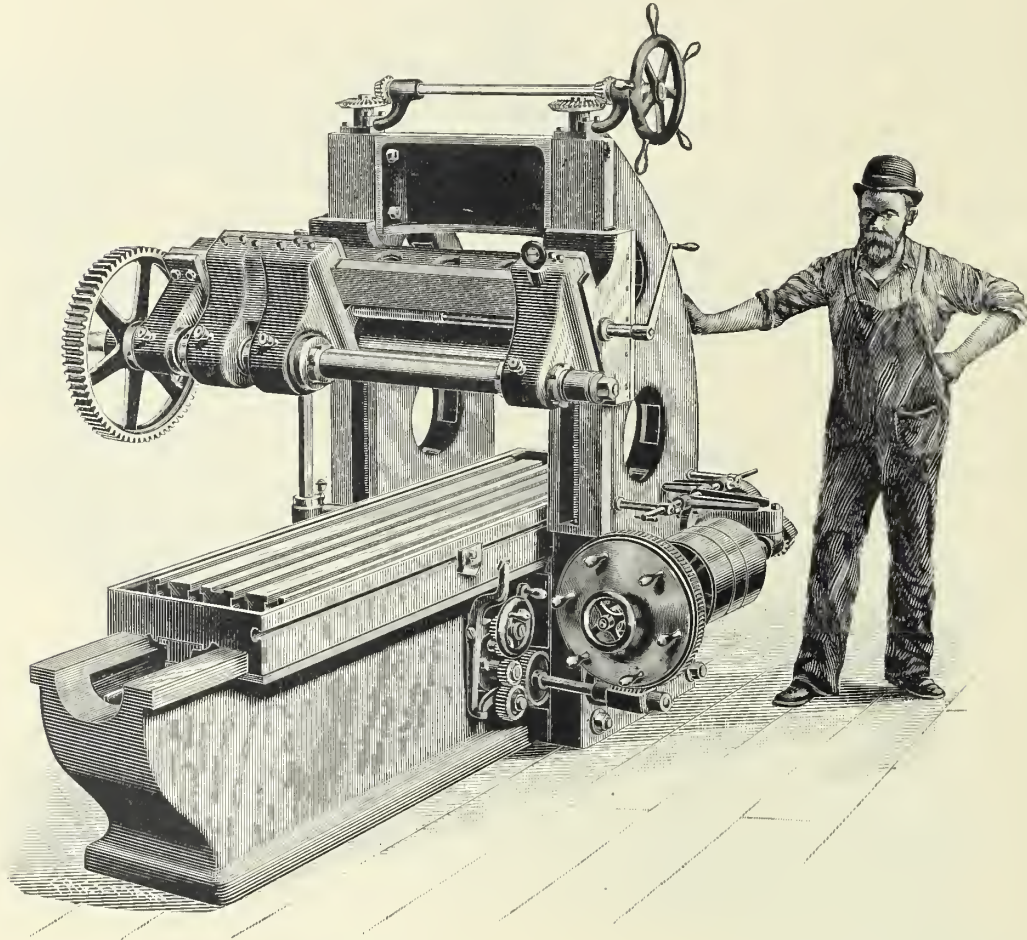


15 x 15 INCH x 4 FEET SLAB MILLING MACHINE.

THE TABLE is 15½ inches wide, 5½ inches deep, 4 feet 8 inches long, and 4 feet between the pockets.
 Feed motion is screw feed, with power quick return. Four changes of feed with each of the six changes of cutter speed.
 Bed casting is 6 feet long.
 Column is 5 feet high, 16 inches wide.
 The saddle carries spindle, and is gibbed to column with bearing 22 inches. Adjusted vertically by hand wheel. This adjustment is graduated to read in thousandths.
 The spindle is 4½ inches in diameter, with bearing in saddle of 16 inches long. Horizontal adjustment, 6 inches, and six changes of speed.
 The arbor is 2 inches in diameter, with outer bearing 4 inches long, which can be moved on the arm close up to the column.
 Swing cutters 10 inches in diameter, 15½ inches wide, can be swung on this machine.
 Driving cone is three stepped for 3½ inch belt—from 18 inches to 14 inches.
 Countershaft furnished with each machine. Two speeds, 108 and 206 revolutions per minute.
 Pump and water tank furnished with machine.
 Weight, 6500 pounds.

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FIG. 136.



24 x 24 INCHES x 6 FEET SLAB MILLING MACHINE.

THIS MACHINE can be made to mill any length. The table is 21 inches wide, 6 feet between pockets, and $6\frac{1}{4}$ inches deep. Adjusted by power in either direction, thirty feet per minute.

Total length of bed castings, 9 feet 6 inches.

Feed motion is spiral geared, variable, by means of friction disc, from $\frac{3}{16}$ inches per minute, slowest cutter speed, to 5 inches per minute, fastest cutter speed. Automatically stopped at any point.

Spindle is $4\frac{1}{2}$ inches in diameter, with 25 inch bearing, back geared 20 to 1. Eight changes of speed. Horizontal adjustment of 12 inches.

Spindle gear is 24 inches in diameter on pitch line. Three pitch.

Arbor is $2\frac{1}{2}$ inches in diameter with out board bearing $5\frac{1}{2}$ inches long, furnished with machine.

Swing cutters 15 inches in diameter, and 24 inches long can be swung on this machine.

Housing is double webbed, 7 inches wide.

Cross rail is $14\frac{3}{4}$ inches wide. Elevated by hand, reading in thousandths.

Driving cone is four stepped, 20 inches to 14 inches for 4 inch double belt.

Two countershafts furnished with each machine. Speed of driving counter, 266 revolutions per minute; quick return, 225.

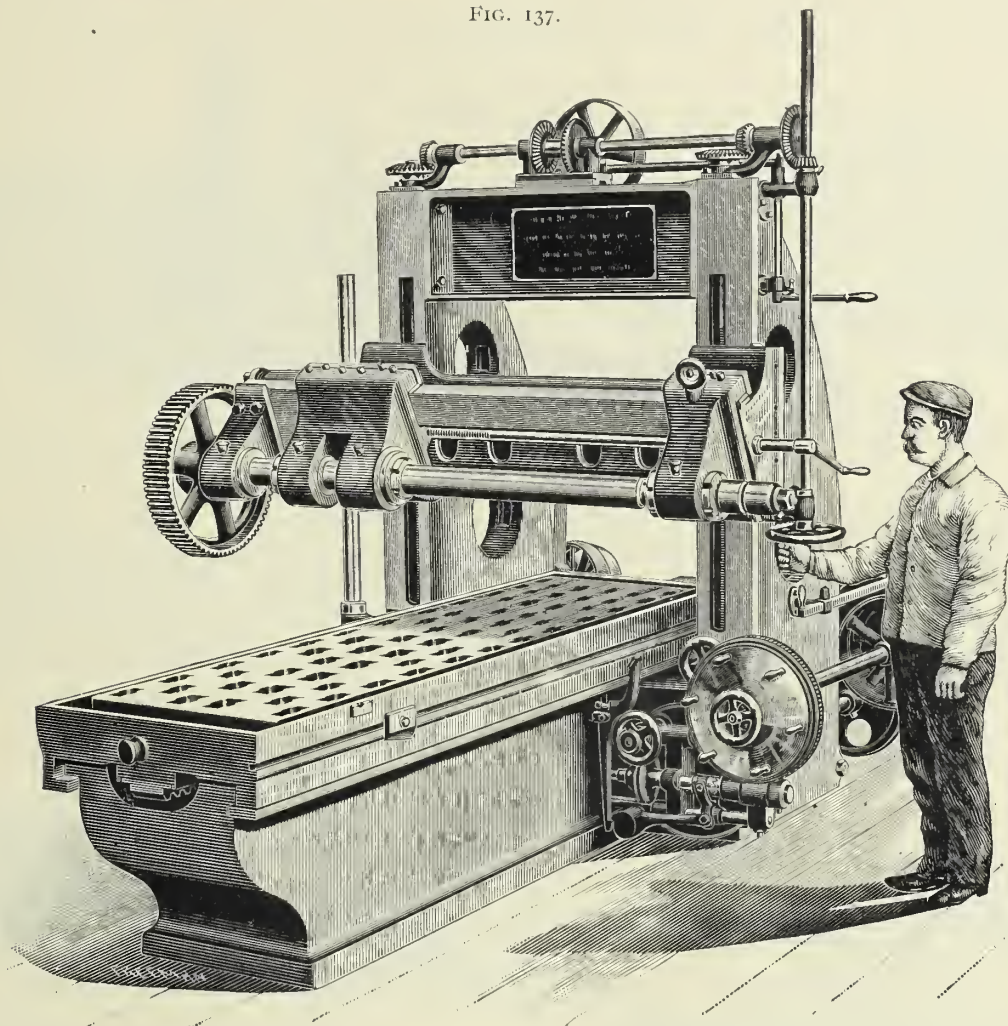
Pump and water tank furnished with each machine.

A vertical spindle can be furnished with this machine at a small additional cost.

Weight about 14000 pounds.

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FIG. 137.



36 x 36 INCHES x 8 FEET SLAB MILLING MACHINE.

THIS MACHINE will mill a piece 36 inches square under a cutter 6 inches in diameter. The table is 30 inches wide, 8 feet between the pockets, and very heavy. Adjusted by power in either direction at the rate of 30 feet per minute.

Feed motion is spiral geared, variable by means of friction disc, from 5 inches per minute, highest cutter speed, to $\frac{3}{16}$ inches per minute, slowest cutter speed. Automatically stopped at any point. Easily adjusted by hand.

Spindle is $5\frac{1}{4}$ inches in diameter, minimum length of bearing, $25\frac{1}{2}$ inches. Back geared 24 to 1 with 8 changes of speed. Horizontal adjustment of 14 inches, vertical adjustment of 36 inches.

Arbor is 3 inches in diameter, with out-board bearing 10 inches long, furnished with machine.

Swing cutters to 15 inches in diameter and 36 inches long can be swung on this machine.

Housings are double webbed, 8 inch face.

Cross rail is elevated by power or hand. Graduated to read in thousandths.

Driving cone is four stepped for 4 inch double belt.

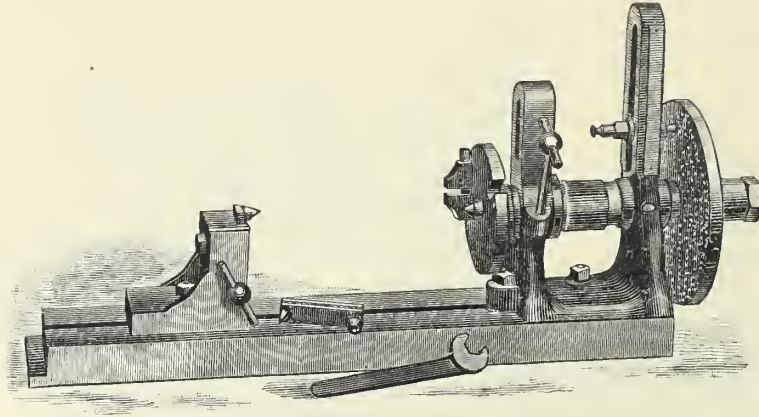
Two countershafts furnished with each machine. Speed of each, 280 revolutions per minute.

Pump and water tank furnished with each machine.

Weight about 22000 pounds.

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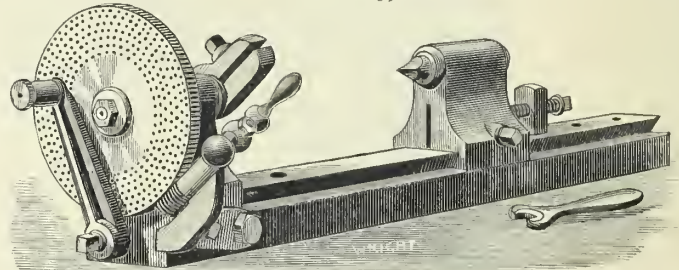
FIG. 137.



PLAIN INDEX CENTERS.

THESE CENTERS are intended for use in shops where spirals and bevel gears are not required to be cut, and are a splendid substitute for the more expensive universal indexing and dividing head. They may be used to advantage also on the planer or shaper. It will swing twelve inches. The spindle has $\frac{3}{4}$ inch hole with taper socket. The center bar in tailstock is elevated or lowered by means of rack and pinion for taper work. It is also reversible with two centers, one with top milled off to bring cutter close to the center of the work. This center bar can be firmly locked. There is a clamping arrangement on the spindle which locks it firmly during cutting operation, relieving index pin and dial plate of all strain. Two dial plates are furnished for divisions up to 100.

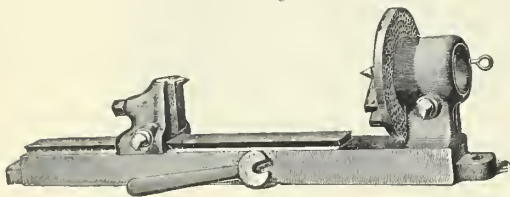
FIG. 139.



No. 3 INDEX CENTERS.

These Centers have dial moved by worm. They will swing a diameter of $5\frac{3}{8}$ inches, and take in a length of 15 inches. Extreme length of bed is $29\frac{3}{4}$ inches. Dial is provided with rows of 44, 48, 56, 72, 84 and 96 holes respectively.

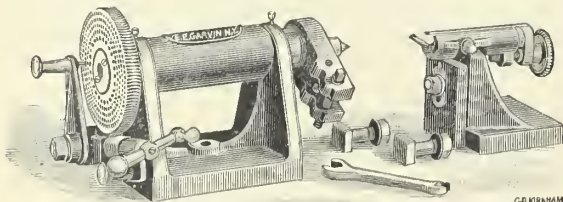
FIG 138.



"EVERY DAY" CENTERS.

These centers swing 6 inches, and will take between centers 16 inches. The index plate has five circles divided into 60, 56, 54, 52 and 48 holes. Index plate, spindle and dogging plate are cast in one piece. The centers are hardened. Heads of all screws fit the same wrench.

FIG. 140.



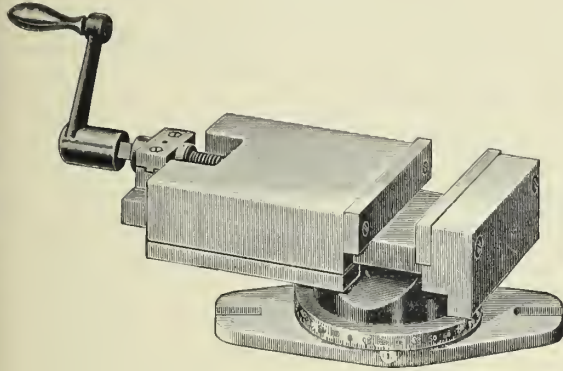
No. 5 INDEX CENTERS.

These Planer Centers will swing a diameter of 12 inches, are of substantial proportions and well made, and will hold rigidly any work that comes within their range. The head and tailstocks are provided with steel tongue pieces to preserve the alignment. There is a worm and gear for turning and holding the headstock spindle, thus relieving the index pin and holes of all the strain, and the attendant wear and loss of accuracy. The worm gear has five accurately drilled circles of holes as follows: 26, 44, 54, 64 and 70. The worm can be dropped out of gear when it is desired to turn the

dial without it. The tailstock spindle has a vertical adjustment for handling taper work. The head and tail together weigh 90 pounds.

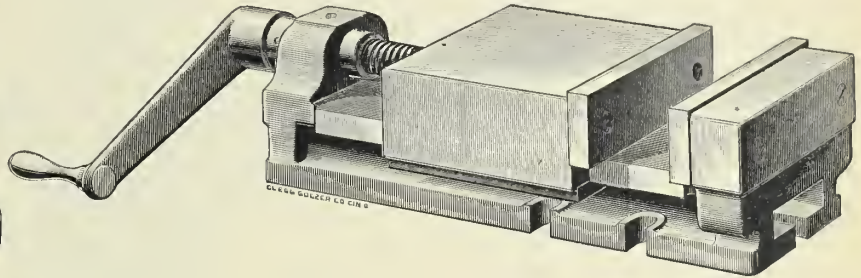
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FIG. 141.



SWIVEL MILLING MACHINE VISES.

FIG. 142.



PLAIN FLANGED MILLING MACHINE VISES.

VISE shown swiveling has a graduated base and ends of jaws open for better clamping long work in an upright position. The bed plate is provided with tongues fitting in slot of table. The No. 1 Vise is furnished with Nos. 1 and 2 Universal, and the No. 2 with No. 3 Universal Machines.

DIMENSIONS.

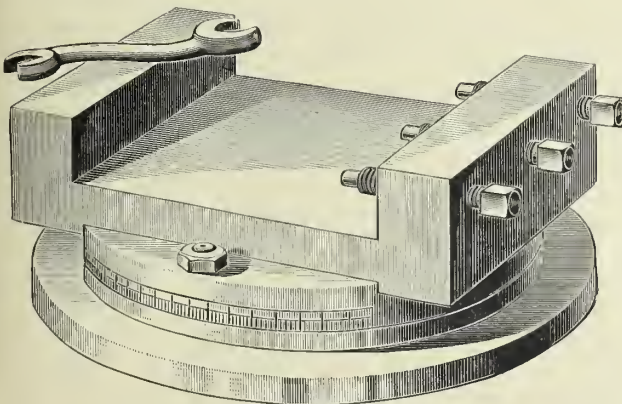
Size,	-	-	-	1	2
Depth of jaws,	-	-	-	1 $\frac{7}{8}$ inches	1 $\frac{1}{2}$ inches
Width of jaws,	-	-	-	6 inches	7 inches
Jaws open,	-	-	-	3 $\frac{1}{2}$ inches	4 $\frac{1}{2}$ inches
Weight,	-	-	-	50 pounds	75 pounds

VISE shown has ends of jaws open for better clamping long work. The bed plate is flanged for clamping, and is provided with tongues fitting in slot of table. These vises may be clamped parallel or right angular to table, as tongues are detachable. No. 1 is usually furnished with Nos. 1 and 2 Plain and the No. 3 with No. 3 Plain Machines.

DIMENSIONS.

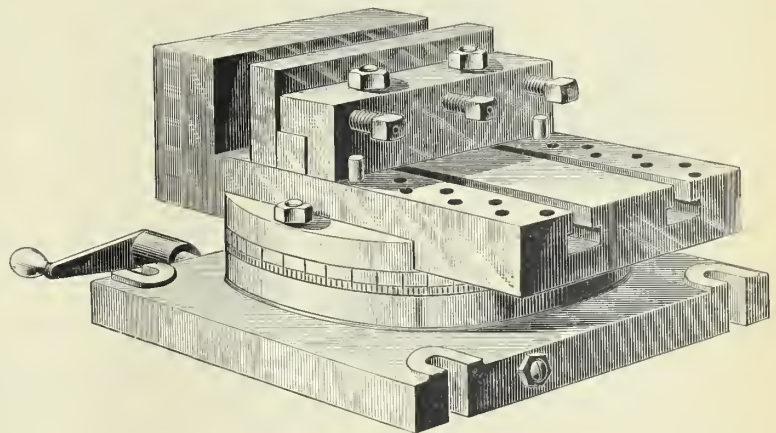
Size,	-	-	-	1	3
Depth of jaws,	-	-	-	1 $\frac{7}{8}$ inches	2 $\frac{3}{8}$ inches
Width of jaws,	-	-	-	6 inches	8 inches
Jaws open,	-	-	-	3 $\frac{1}{2}$ inches	6 inches
Weight,	-	-	-	35 pounds	90 pounds

FIG. 143.



SQUARE BASE MILLING MACHINE VISE.

FIG. 144.



ROUND BASE MILLING MACHINE VISE.

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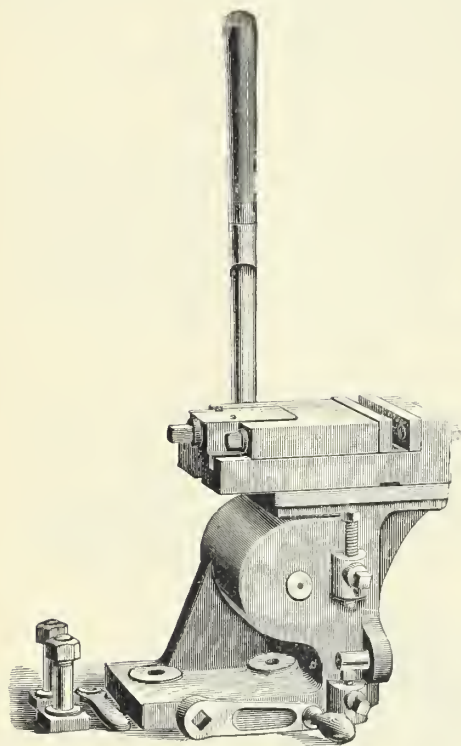
MILLING MACHINE CUTTER ARBORS.

MILLING MACHINE COLLETS.

No.	Diameter.	Length from Shoulder to Nut.	Machine.	No. of Taper.	Price.
1	$\frac{5}{8}$ inch.	4 inches.	No. 1 Universal.	10	\$5 50
2	$\frac{7}{8}$ "	4 "	" "	10	5 50
3	1 "	4 "	" "	10	5 50
10	$\frac{7}{8}$ "	6 "	Nos. 1 and 2 Plain.	10	7 50
11	1 "	6 "	Nos. 1 and 2 Universal.	10	7 50
12	1 1-16 "	6 "	" " " "	10	7 50
15	$\frac{7}{8}$ "	8 "	No. 3 Plain and "	11	9 00
16	1 "	8 "	" " " "	11	9 00
17	1 1-16 "	8 "	" " " "	11	9 00
18	1 $\frac{1}{4}$ "	8 "	" " " "	11	9 00

Size.	Price.	Machine—Where Used.	Outside Taper No.	Inside Taper No.
A	\$2 50	Nos. 1 and 2 Universal and Plain Machines (inner collet).	7	1
C	3 50	No. 3 Universal and Plain Machine (inner collet).	9	5
E	3 25	Nos. 1 and 2 Universal and Plain Machines.	10	7
G	4 50	No. 3 Universal and Plain Machine.	11	9

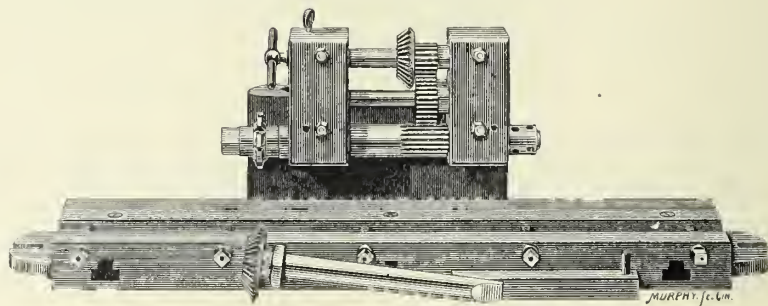
FIG. 146.



VERTICAL MILLING ATTACHMENT.

This attachment here shown is the same as that used on No. 3 Hand Milling Machine, but can be attached to any of our other milling machines, making a very rapid and convenient means of milling short vertical cuts, and, in connection with the table feed, both horizontal and vertical cuts can be taken. The vertical slide has a movement of 2 inches by hand lever, pinion and rack, and is provided with stops for regulating depth of cut. Net weight, 65 pounds.

FIG. 147.



IMPROVED RACK CUTTING ATTACHMENT.

This is so constructed as to revolve the milling cutter transversely to main spindle of machine. It is made to fit on any size machine. Racks to any length can be cut. A vise 30 inches long for holding racks is furnished with this attachment. It may be used for cutting off pieces from bars of iron or steel of any length. Two sizes of this attachment are made.

VERTICAL SPINDLE MILLING ATTACHMENT.

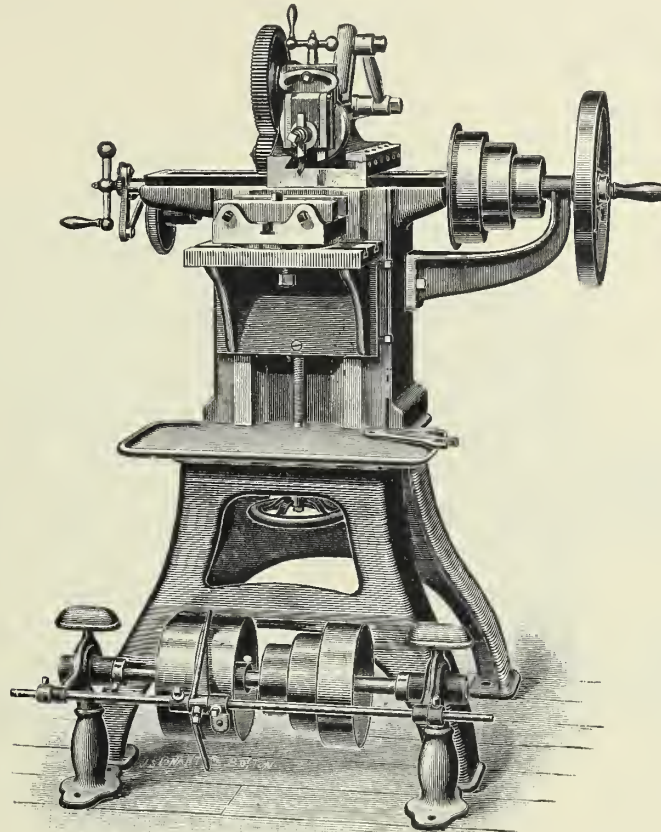
Two sizes of this attachment are made. Photographs and full details mailed on application.

No. 1 is used on Nos. 1 and 2 Plain and Universal Machines.

No. 2 is used on No. 3 Plain and Universal Machine.

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FIG. 148.



SIX INCH SHAPING MACHINE.

THIS SHAPER will be found very convenient, and capable of doing accurate work. It will take full six inch stroke, and can easily be adjusted to any less distance required. The driving shaft and feed screws are made of the best of steel. The screws and other parts, where necessary, are case hardened. The feed is automatic and reversible. The cutter bar has a graduated swivel head. The table is 6 x 6 inches, and elevates by hand. A six inch swivel chuck is furnished with each machine.

SPECIFICATIONS.

Length of stroke,	- - - - -	6 inches
Length of traverse,	- - - - -	6 inches
Vertical adjustment of table,	- - - - -	5 inches
Driving pulleys on countershaft,	- - - - -	6 x 2½ inches
Cone pulleys, three grade,	- - - - -	3, 4½ and 6 x 1¾ inches
Revolutions of countershaft,	- - - - -	220
Weight,	- - - - -	350 pounds

EIGHT INCH SHAPING MACHINE.

THIS MACHINE will plane up to full 8 inches in length, and is conveniently adjusted for shorter strokes. The cross feed is automatic, reversible, and has a wide range from the finest to coarsest grade. The screw, as well as all the shafts, are of steel, and the wrought iron work is case hardened. The cutter bar has a graduated swivel head for down and angular feed. The table has a vertical movement of 7 inches, adjusted by means of a screw. The driving shaft, which is strongly geared, is provided with a balance wheel fitted with a handle, by means of which the machine can be operated by hand in case of an emergency. The machine is fitted with a swivel chuck, and other appliances required with machines of this class.

SPECIFICATIONS.

Length of traverse,	- - - - -	8½ inches
Vertical adjustment of table,	- - - - -	7 inches
Three cone pulley,	- - - - -	4¾, 6¾ and 8 x 2 inches
Driving pulley on countershaft,	- - - - -	8 x 2½ inches
Weight,	- - - - -	600 pounds

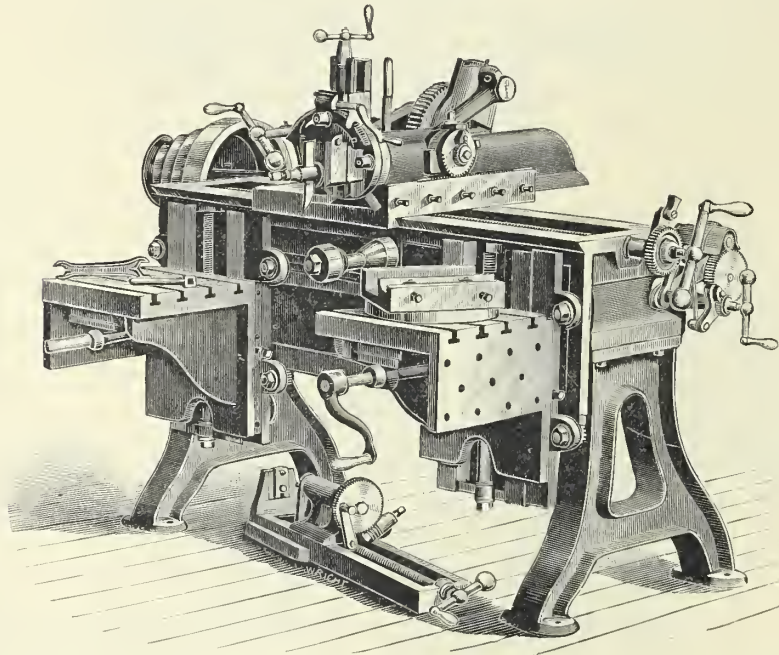
10 INCH SHAPING MACHINE.

SPECIFICATIONS.

Length of stroke,	- - - - -	10 inches
Length of traverse,	- - - - -	8½ inches
Table,	- - - - -	8 x 10 inches
Vertical adjustment of table,	- - - - -	7 inches
Driving pulleys on countershaft,	- - - - -	10 x 2½ inches
Cone pulleys, three grade,	- - - - -	4¾, 6¾ and 8 x 2 inches
Revolutions of countershaft,	- - - - -	100
Weight,	- - - - -	775 pounds
Suitable centers for fluting reamers, taps, etc., furnished when ordered.		

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FIG. 149.



12 INCH STROKE SHAPER.

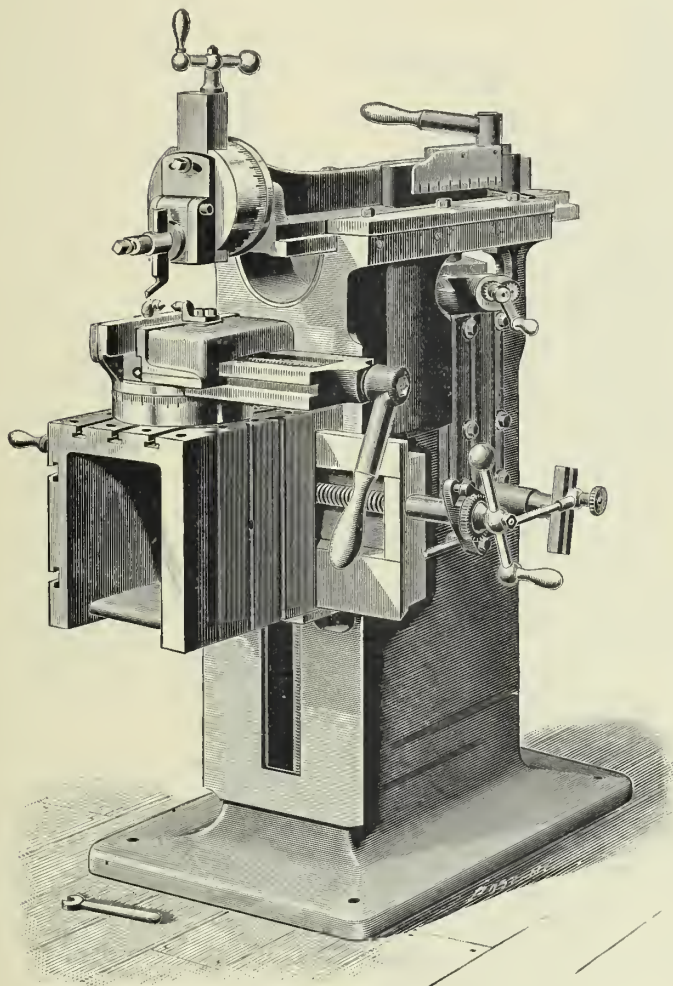
THE sliding bar or ram has a stroke of twelve inches, or any less distance. By a patent device the length of the stroke can be readily adjusted while in motion, as can also the position of the bar.

It is driven by suitable gears fitted with the Whitworth quick return. The saddle, or traveling head, has an automatic horizontal feed of 40 inches. The tool head has an automatic vertical or angular feed. It also has a circular feed for planing the inside arcs of circles. The machine has an automatic circular feed which will feed the entire circle, a suitable mandril with cones and collars being furnished for the purpose. The vise swings at any horizontal angle and is graduated. The angle irons which support the platen, vise, or centers, are gibbed to the vertical slide, and have (by means of a screw, shaft and gears) a vertical adjustment of 15 inches; and are readily moved the entire length of of the bed (which is 4 ft., 10 in.) by rack and pinions underneath. All slides and flat surfaces are carefully fitted by scraping to surface plates. All gears are cut from the solid, the smaller ones being made of steel, as are all shafts, studs and lathe-cut screws. A vise, circular feed mandril, countershaft and wrenches are furnished with each machine. The tight and loose pulleys on countershaft are 14 inches in diameter, and should run about 110 revolutions per minute.

Weight of machine, complete as per cut, 3200 pounds.

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FIG. 150.



16 INCH STROKE.

IMPROVED PATTERN CRANK SHAPERS.

THIS cut represents our new quick return Crank Shaper, the stroke of which can be readily adjusted while machine is in operation.

The quick return is obtained by the link motion instead of sliding block, which is so liable to wear.

The stroke is changed by crank handle which operates two screws, one of which moves the saddle on saddle lever, and the other a gib to hold the saddle firmly to the lever, thereby making all joints tight from power shaft to the ram.

When the ram is at extreme point of return, and ready for forward stroke, the pointer will indicate on plate fastened to clamping device the length of stroke.

The feed mechanism of table is so constructed as to avoid breaking or bending of parts in case any obstruction is encountered while machine is in operation.

We can furnish with these Shapers three different styles of vise, either a parallel jaw vise with centers, single screw, as shown in cut; parallel swivel jaw vise with centers, single screw; or a swivel jaw vise operated by two screws. All have graduated swivel bases.

The gearing of these machines is very strong, being in 12 in. stroke 1 to 12; 16 in. stroke 1 to 14; 22 in., 24 in., 26 in. and 28 in stroke 1 to 20.

SPECIFICATIONS,

WITH SQUARE SLIDES ON RAM.

Stroke.	Planes.		Parallel Jaw Vise.			Swivel Jaw Vise.			Countershaft Pulleys.	Revolutions per Minute.	Weight.
	Width.	Over Vise.	Opens.	Depth.	Width.	Opens.	Depth.	Width.			
12 in.	15½ in.	12 in.	8 in.	1¾ in.	8 in.	6½ in.	1¾ in.	8 in.	10 in. x 2¾ in.	260	1300
16 "	18 "	15½ "	10 "	2 "	10 "	8½ "	2 "	10 "	10 " x 3 "	260	1750
22 "	25 "	15½ "	12 "	2 "	12 "	10½ "	2 "	12 "	12 " x 4 "	260	2400
26 "	27½ "	15½ "	14 "	2¼ "	14 "	12½ "	2¼ "	14 "	12 " x 5 "	260	3400

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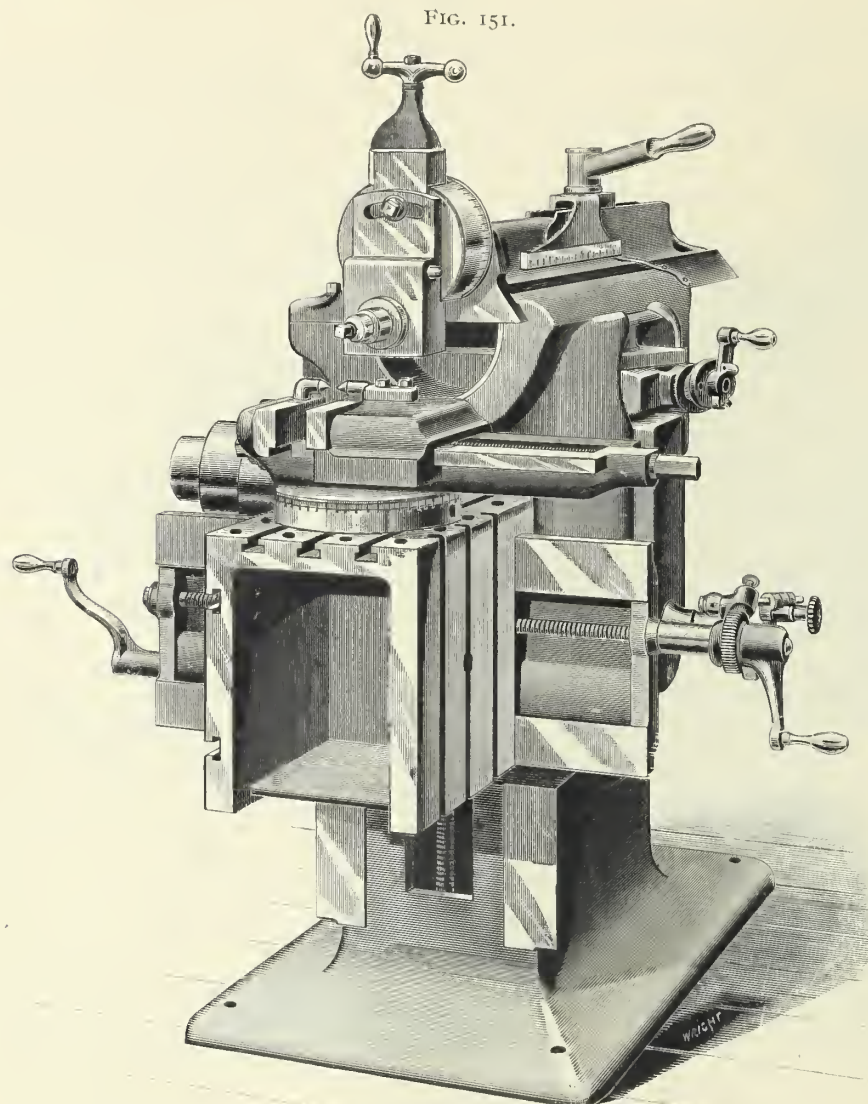


FIG. 151.

IMPROVED CRANK SHAPER WITH "V" SLIDES ON RAM.

THE above cut represents our new quick return Crank Shaper, with **v** slides on ram, the stroke of which can be readily adjusted while machine is in operation. The quick return is obtained by the link motion instead of sliding block, which is so liable to wear. The stroke is changed by crank handle which operates two screws, one of which moves saddle on saddle lever, and the other a gib to hold the saddle firmly to the lever, thereby making all joints tight from power shaft to the ram. When the ram is at extreme point of return, and ready for forward stroke, the pointer will indicate on plate fastened to clamping device the length of stroke. The feed mechanism of table is so constructed as to avoid breaking or bending of parts in case any obstruction is encountered while machine is in operation.

We can furnish these Shapers with three different styles of vise, either a single screw parallel swivel jaw vise with centers as shown in cut, a single screw parallel jaw vise with centers, or a swivel jaw vise operated by two screws. All have graduated swivel bases.

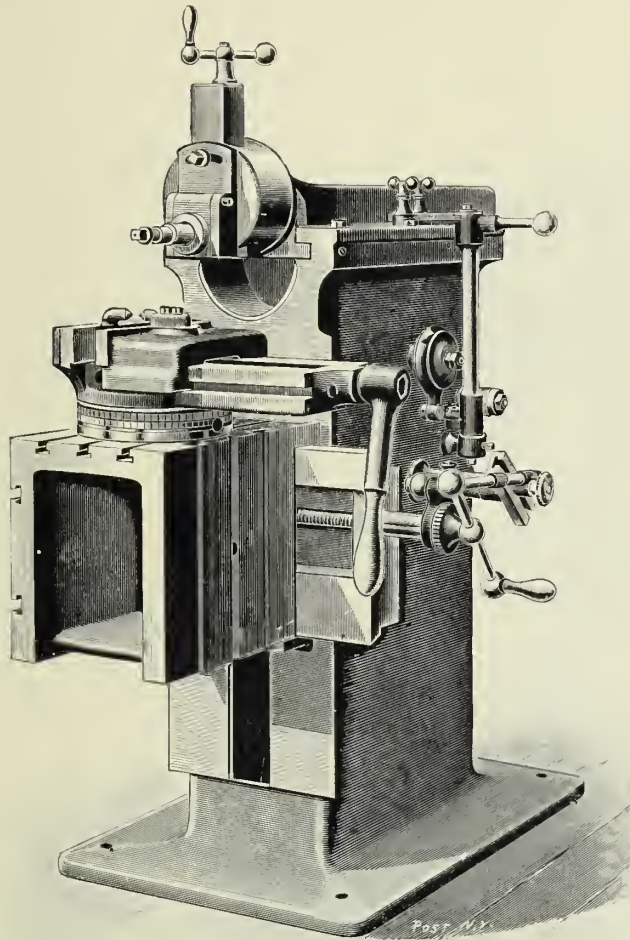
The gearing on this machine is very strong, being in 13 inch stroke, to 1 to 13; 18 inch stroke, 1 to 14; 24 inch and 28 inch stroke, 1 to 20.

SPECIFICATIONS.

Stroke.	Planes.		Parallel Jaw Vise.			Swivel Jaw Vise.			Countershaft Pulleys.	Revolutions per Minute.	Weight.
	Width.	Over Vise.	Opens.	Depth.	Width.	Opens.	Depth.	Width.			
13 in.	15½ in.	12 in.	8 in.	1¾ in.	8 in.	6½ in.	1¾ in.	8 in.	10 in. x 2¼ in.	260	1300
18 "	18 "	15½ "	10 "	2 "	10 "	8½ "	2 "	10 "	10 " x 3 "	260	1750
24 "	24 "	15½ "	12 "	2 "	12 "	10½ "	2 "	12 "	12 " x 4 "	260	2400
28 "	28 "	15½ "	14 "	2¼ "	14 "	12½ "	2¼ "	14 "	12 " x 5 "	260	3400

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FIG. 152.



IMPROVED PATTERN FRICTION SHAPERS.

22 INCH STROKE.

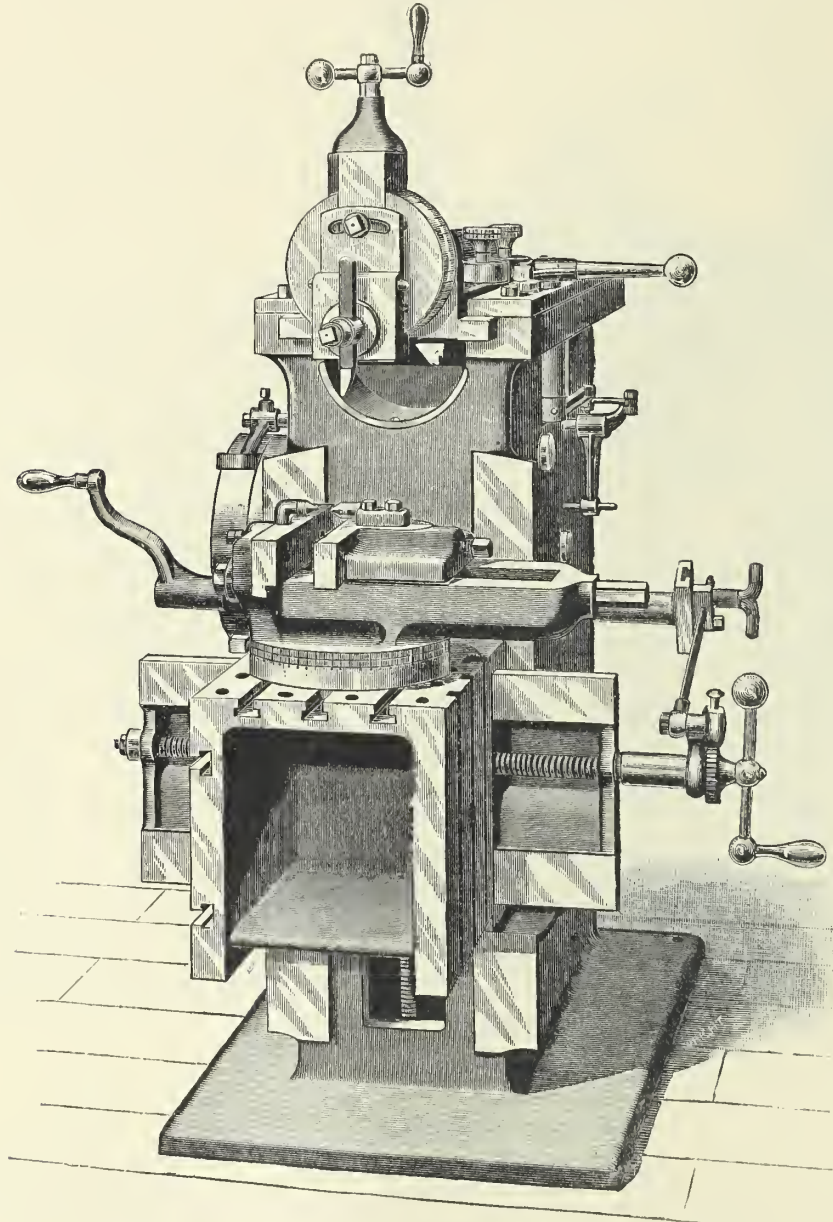
THE stroke of these machines can be readily changed while in motion to any length from $\frac{1}{4}$ inch to its full extent by simply shifting the tapets or dogs similar to those on a common planer. There are two different speeds for cutting either steel or the softer metals. The return stroke is 40 per cent. quicker than cutting stroke. It is driven by means of two belts, one open and the other closed. The grip is produced by two leather surfaces brought together in such a manner as to cause the grip to tighten in proportion to the resistance of the work. The machine is therefore able to take an exceptionally strong cut, in fact, all the driving belt can pull without danger of slipping. The friction feed does not consume any power when not feeding. We can furnish with these shapers three different styles of vise, either a parallel jaw vise with centers, single screw, as shown in cut; parallel swivel jaw vise with centers, single screw; or a swivel jaw vise operated by two screws. All have graduated swivel bases. The 16 and 22 inch shapers are single rack machines. The 26 and 32 are double rack machines. The 16 inch machine will key-seat shafts up to 3 inches diameter. The 22 and 26 inch up to 4 inches diameter, and the 32 inch up to $4\frac{1}{2}$ inches diameter. Countershaft should make 240 revolutions per minute.

SPECIFICATIONS.

Stroke.	Planes, Width.	Planes, Height.	Countershaft Pulleys.	Revolutions per Minute.	Weight.
16 inches.	16 inches.	18 inches.	10 x 3 inches.	240	1050
22 "	20 "	18 "	10 x 3 "	240	1700
26 "	20 $\frac{1}{2}$ "	18 "	12 x 3 "	240	2100
32 "	22 "	18 "	12 x 3 "	240	2300

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FIG. 153.



PRENTISS THIRTY-TWO INCH SHIFTING BELT SHAPER.

THE above engraving represents a triple geared Shifting Belt Shaper made in three sizes, twenty-two, twenty-six and thirty-two inches.

The twenty-six and thirty-two inch machines are made with two racks and gears placed apart on the inside of machine to allow a bar of $4\frac{1}{2}$ inches diameter to pass between the gears under the ram (or cutter bar) through the machine to enable the operator to cut a key way at any desired point in same. These gears are of large diameter and the racks are of steel. The shafts are all of large diameter and have bearings on both sides of column.



SHIFTING BELT SHAPERS.

General Description Continued.

THE twenty-two inch has one rack placed on one side which allows a three and one-quarter bar to pass under the ram and through the machine to cut a key way at any point ; the shafts are also of large diameter and have bearing on both sides of column, as in thirty-two inch machine.

The bearings are very powerful. In the twenty inch there are fifty lineal feet of one and one-quarter inch belt to one foot motion of the ram, and in the thirty-two inch fifty-eight lineal feet of one and one-quarter inch belt to one foot motion of the ram.

The belts are shifted by a cam motion which is operated by two rollers that act the same as the shift-dogs on a common planer, thus decreasing the wear and jar so that it can be run at any reasonable speed. The return stroke of ram is now arranged at speed of two to one, but can be made to return at any desired proportion by changing the size of pulleys on countershaft.

The feed mechanism is so constructed as not to consume any power after the feeding is done, it being operated by a friction, which also prevents the bending or breaking of parts in case the table meets with any obstruction.

The head has an angular feed in any direction which can be arranged to operate by power, when so ordered. This feed mechanism is a novel contrivance constructed to use the power only for feeding and releasing the feed bar when cutting is done, consequently putting no extra strain or wear on the gearing of the machine.

The vises furnished with these machines have a single screw passing through the end of vise, causing the screw to take most of the strain from clamping by a nut and washer at the end ; the jaw is arranged to swivel, so an irregular piece can be held. The centers with which every vise is furnished remain in line regardless of the position in which the jaw is placed.

The table is of box form and has two T slots on each side, and in addition there is a slot on right hand side of table to clamp vise to the side of same for planing off ends of bars, etc.

We furnish with these machines either a swivel or parallel jaw vise with single screw, or a chuck with swivel jaw and two screws ; the vises and chuck have graduated bases and steel faced jaws.

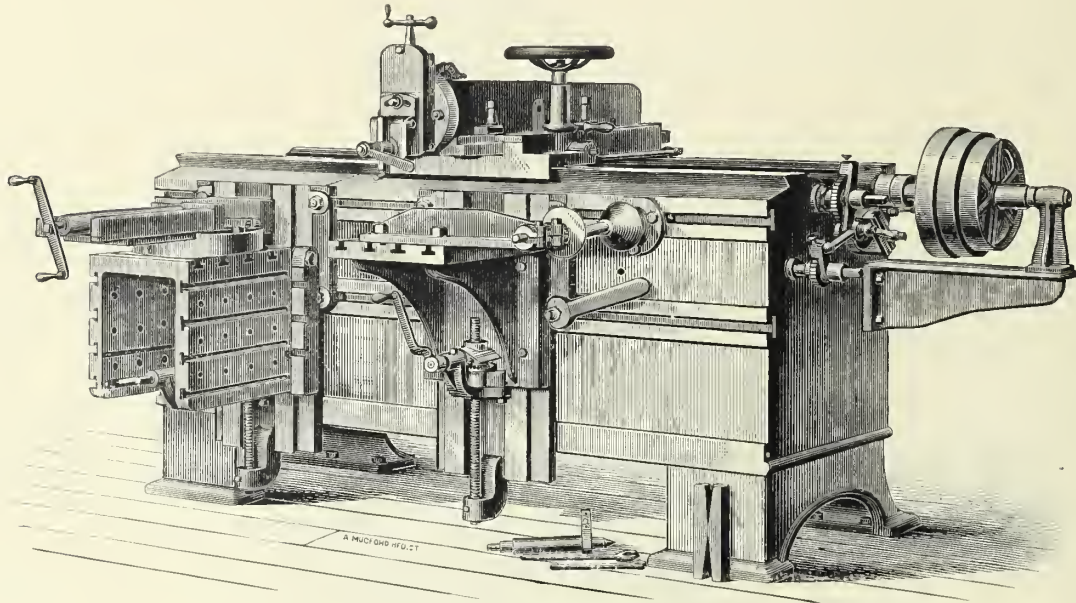
All surfaces are scraped to a fit. All gears and racks are cut ; the screws, shafts, etc., are all made of steel. The screws, nuts etc., that are subject to wear are case hardened.

SPECIFICATIONS.

Stroke.	Planes Over		Cross Feed.	Feed in Head.	Vise.			Pulleys on C'shaft.	Rev. of C'shaft.	Weight.
	Table.	Vise.			Opens.	Depth.	Width.			
22 inches.	18 inches.	13 inches.	20 inches.	6 inches.	8 inches.	2 inches.	10 inches.	8 x 4 ins.	360	1700
26 "	19 "	15 "	22 "	6 "	8 "	2 "	10 "	10 x 3 "	390	1900
32 "	20 "	15 "	24 "	8 "	10 "	2 1/4 "	12 "	10 x 4 "	360	2500

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FIG. 154.



TRAVERSE SHAPER.

20 INCH STROKE. 60 INCH TRAVERSE OF HEAD.

THIS SHAPER is designed for railroad and other machine work. It has a stroke of 20 inches, and can be set to any length of stroke while the machine is in motion, thereby making a saving in time over a crank shaper. The saddle has a traverse on the bed of 60 inches, but the machine can be made longer, if desired. The machine has power feed operated from the pulley end of the bed. The head has power down feed. Circular arbor has power feed also. The hand wheel on top of saddle is for setting the tool to the work by hand. The tables are both made in box form, and one is fitting with our patent adjustment for planing taper work. The tables are easily taken off to fasten large work to the bed, if desired. The bearings on this machine are all made of hard bronze, and shafts and screws are of steel. Since the cut was made we have increased size of driving wheels, and now make both tables box form. Weight of machine, 7000 pounds.

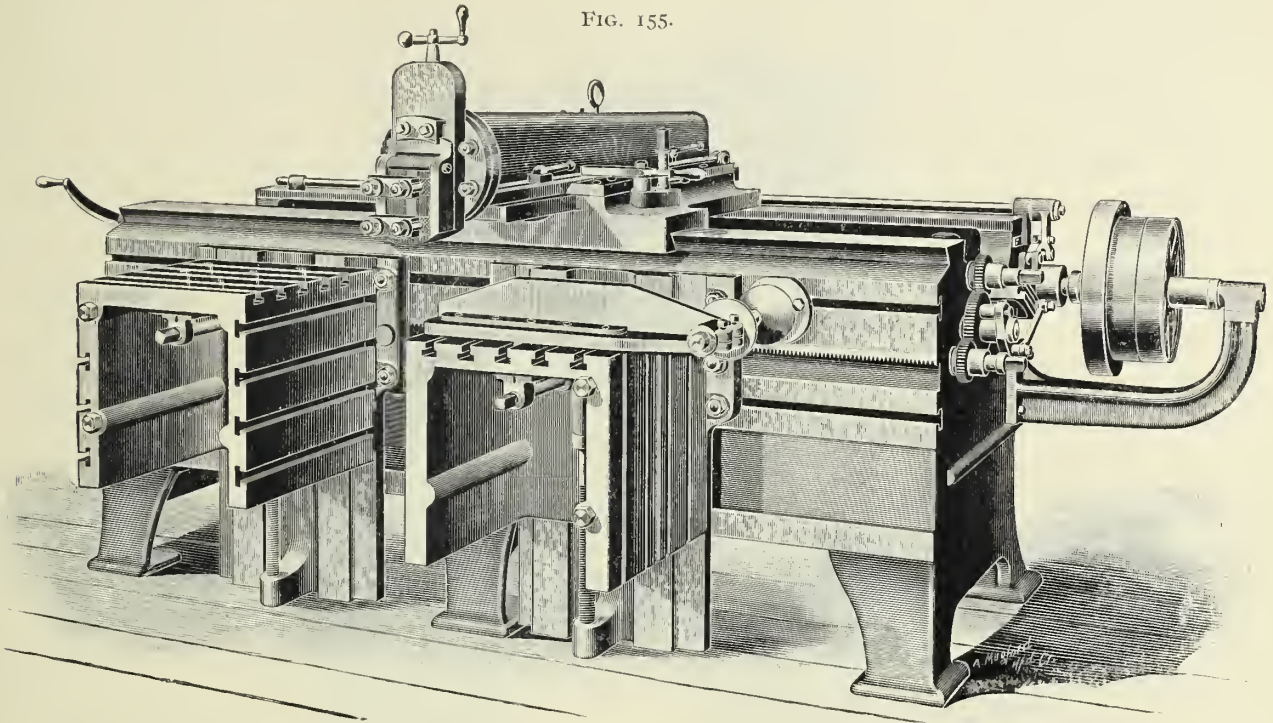
TRAVERSE SHAPER.

15 INCH STROKE. 36 INCH TRAVERSE.

THIS SHAPER has 15 inch stroke of cutter bar and 36 inches traverse of saddle on bed, and will plane a piece on table 14 inches high. It has our patent friction driving movement. The stroke can be changed while machine is in motion, the cutting speed remaining the same entire length of cut. The table and saddle can be moved on one side, or entirely removed from bed, so that work may be fastened to front or face of bed, as shown by bolt-slots. The vise has graduated swivel base, and will open 8 inches to receive work. The jaws are faced with steel, and extra jaws are furnished to hold irregular shaped work. Weight, 2500 pounds.

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FIG. 155.



FRONT VIEW OF TRAVERSE SHAPER.

30 INCH STROKE. 72 INCH TRAVERSE OF HEAD.

THIS SHAPER is designed for railroad and other heavy work. It has a stroke of 30 inches, and can be set to any length of stroke from 1 to 30 inches while the machine is in motion, thereby making a saving in time over the crank shaper.

The saddle has a traverse on the bed of 72 inches, but the machine can be made of any length desired to suit special work. It has feed works at each end to feed the saddle back and forth, so that in using the tool on one end or the other the feed is always convenient to hand. The saddle can be run fast by hand from one end to the other when desired to change the position on bed, each turn of crank moving it $2\frac{3}{8}$ inches. It also has an adjustable handle on the saddle to use in setting tool close to work when starting machine. The head has automatic vertical feed, and can be set to any angle. The circular arbor also has independent feed, and is operated from the pulley end of the machine. The tables are raised and lowered by screws, and the aprons on which the tables work are moved on bed by rack and pinion. Tables are 20 x 20 inches on top. The aprons have a bearing low down on the bed to insure solidity when taking a heavy cut. The vise jaws open 15 inches and are 15 inches long. Vise is graduated and swivels on a heavy base plate. The vise is operated by one screw $1\frac{1}{4}$ inches in diameter; it is also provided with extra jaws to hold taper work, and eye-bolt to lift it off by tackle, as the weight (500 pounds) is too much to lift by hand. The screws and shafts are all of steel and bearings are of hard bronze. The rack gear and pinion and other small gears are of steel.

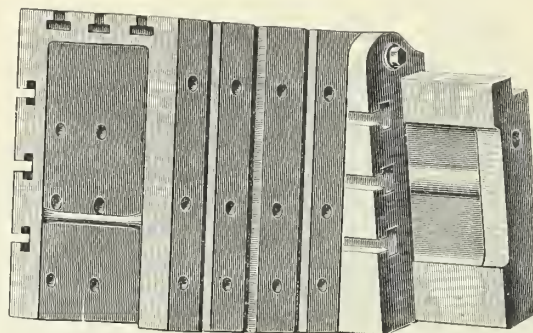
The machine should stand on a brick or stone foundation, and for large work which is to be worked from the floor, we can provide heavy cross beams to stand the machine on, and a heavy cast iron table, with slots and holes like a planer table, to bolt work to; from the top of this table to slide is 44 inches. The tables can be run off easily to make room for large work, and work can be bolted to front.

The countershaft has two sets of tight and loose pulleys 12 and 15 inches in diameter, 4 inch face. The speed of countershaft with 12 inch pulleys can be set to any speed required. 12 turns of pulley on machine moves cutter-bar one foot. The speed of countershaft with 15 inch pulleys should be 225 revolutions per minute. This will give $14\frac{1}{2}$ feet per minute to cutter bar on slow speed, and 20 feet per minute on fast speed.

Weight of machine without foundation beams and plate, 10000 pounds.

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FIG. 156.

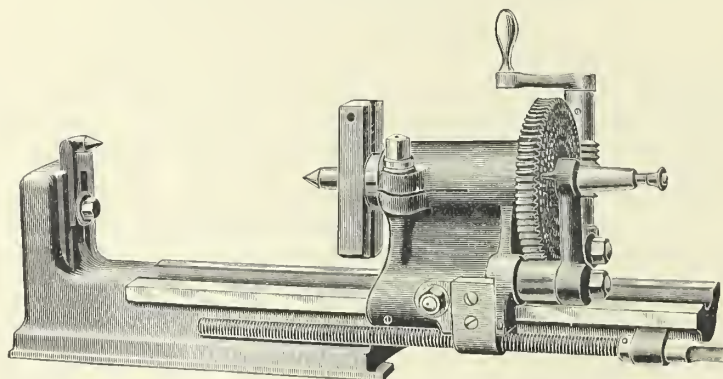


ADJUSTABLE SHAPER TABLE, SET TO PLANE TAPER.

THE above illustration shows one of the positions of our Adjustable Shaper Tables. We furnish these Tables, when desired, in place of the solid table. This style of Table has many advantages. In certain classes of work it is so arranged to plane at any taper desired by means of a screw at the bottom hinged table. The Table is in box form, making it exceedingly strong and solid under a heavy cut.

Work can be bolted on either side as well as on top, and the vise can also be fastened on either side in a vertical position. When the Table is removed the work can be fastened on the saddle of the front of the machine.

FIG. 157.



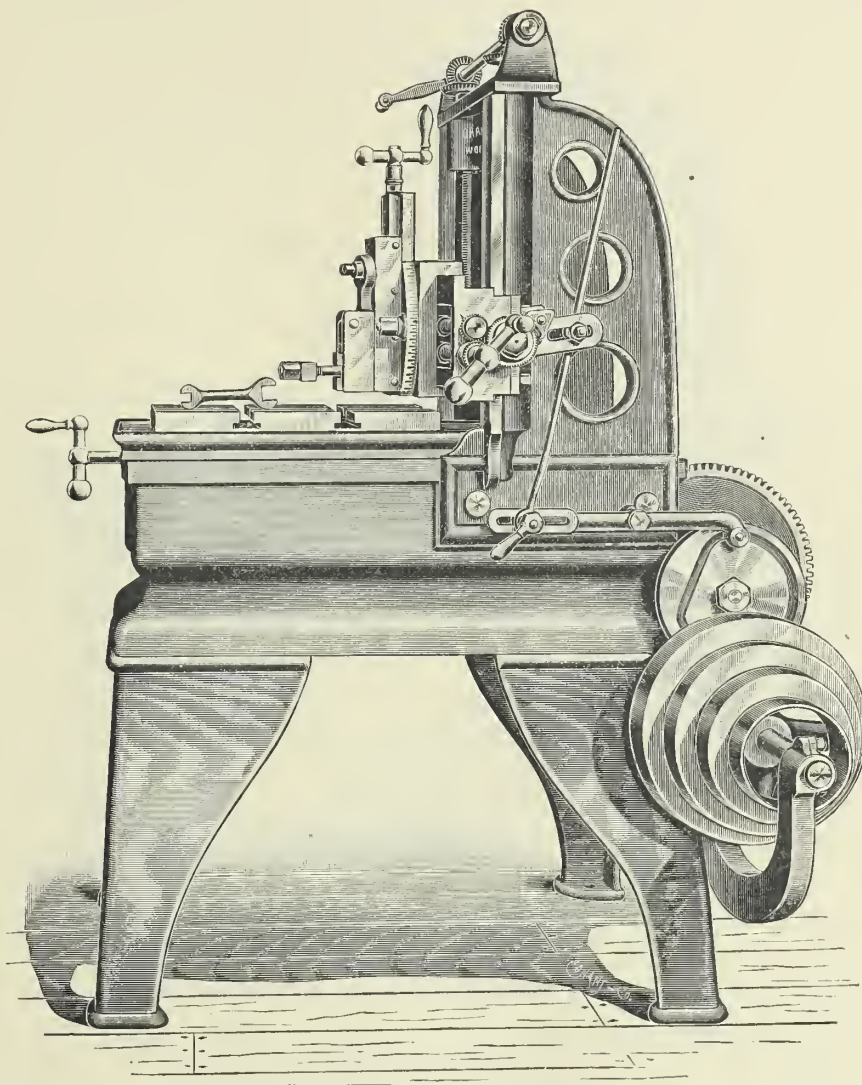
SHAPER CENTERS.

THESE CENTERS will be found of special value for fluting taps and reamers, squaring bolts and nuts, graduating, laying out work, planing irregular forms, etc., etc. They are thoroughly made of the best materials, and are accurate in all respects.

No. 1	swings $6\frac{1}{4}$ inches.	Takes between centers,	-	-	-	-	-	-	12 inches
" 2	" 8	"	"	"	"	"	-	-	15 "
" 3	" $9\frac{3}{4}$	"	"	"	"	"	-	-	18 "

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FIG. 158.



18 INCH CRANK METAL PLANER.

THIS MACHINE presents many advantages over ordinary planing machines for light work. It has both vertical and horizontal feed with swivel head for angular work. The table moves twelve inches on track at full stroke. It will plane eighteen inches long.

The table is kept in position by gibs and has the Whitworth quick return motion. Takes sixteen inches between posts. The length of stroke and position of table are easily adjusted. The running parts are made to take up and compensate for wear. It has four changes of cone for $2\frac{1}{2}$ inch belt and is strongly geared.

Speed of countershaft, 120 revolutions per minute. Size of pulleys on countershaft, 12 inches diameter, $3\frac{1}{2}$ inch face.

Weight, 1750 pounds.



L. W. POND METAL PLANERS.

GENERAL DESCRIPTION.

THESE MACHINES combine the very latest improvements for tools of their class, in addition to many new features not used by other manufacturers.

The beds of these machines are extra deep, heavy and substantial, and are provided with leveling screws which allows of their perfect adjustment, a feature very valuable in this class of tools.

The table is extra heavy, with slides of good width, giving a solid, firm bearing and an extra wearing surface, also having an oil channel cut the entire length to insure perfect lubrication, thus keeping the parts from cutting on heavy work. There are three bolt slots planed from the solid and running the entire length of the table. The holes in the table for the purpose of packing or holding the work firmly in place are carefully drilled and reamed to size.

The uprights carrying the side head are very heavy, with large breadth of base, and are braced so as to prevent springing of the face when a heavy cut is being taken. These uprights are firmly bolted to the bed with large steel taper bolts, and with a large additional steel pin nicely fitted to a drilled and reamed hole in both parts, to make them doubly secure against any lateral strain.

The driving shafts are made of steel, fitted to extra long and large bearings, placed close to gearing, giving steadiness and smoothness to the table when carrying heavy work.

The cross bar is extra strong and heavy and firmly fitted to the uprights, and so arranged that it can be quickly adjusted by power by means of the raise and fall screws. The slides and working parts are carefully scraped to fit.

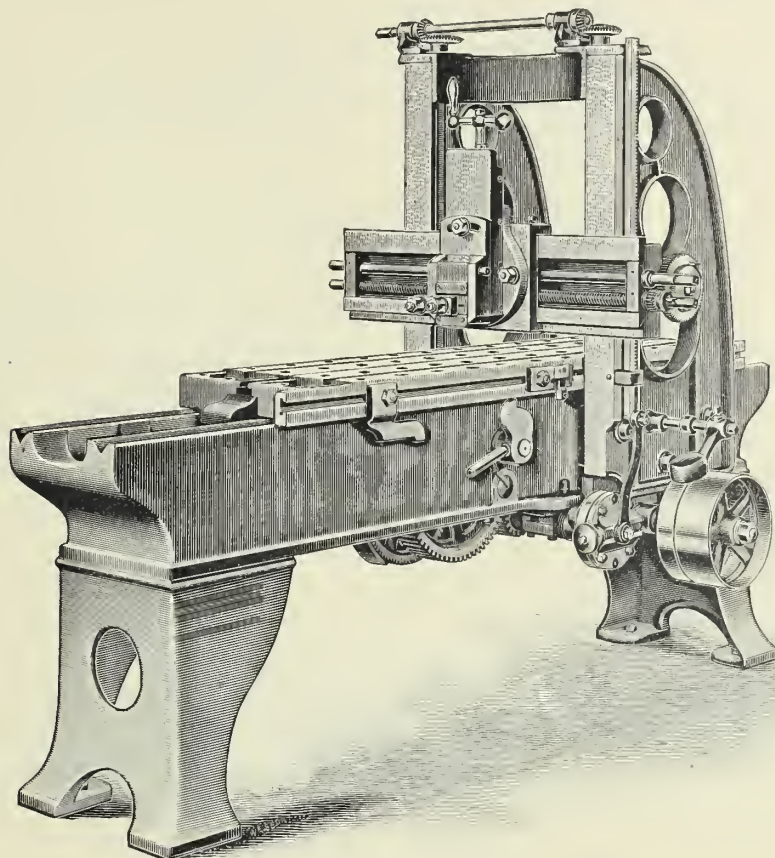
The feed is transmitted to the cross, down and angle screws through the driving shaft, and is supplied with our patent friction arrangement which runs perfectly free and loose after having done its work at the end of the stroke.

The reversing motion is of recent invention. By this arrangement each belt completes its work before the other starts, leaving the machine under perfect control of the operator at any part of the stroke and prevents any unpleasant jar or jerk in reversing, and can be operated from either side of the machine.

For additional information and general specifications, see description of each machine.

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FIG. 159.



16 INCH L. W. POND METAL PLANER.

PLANES $18\frac{1}{2}$ INCHES WIDE, $18\frac{1}{2}$ INCHES HIGH, BY 4 FEET LONG.

THE accompanying cut is an exact reproduction from photograph of the new pattern 18 inch Planer.

The bed is extra deep, heavy and substantial. Length of bed, 6 feet 8 inches.

Extreme length of table, 5 feet, with three T slots and 4 rows of $\frac{3}{4}$ inch holes drilled and reamed in same. Length between pockets, 4 feet. Width of table, $15\frac{1}{2}$ inches. It has a friction feed from 0 to $\frac{1}{2}$ inches, and will feed horizontally, vertically, or at any angle.

All shafting and screws are made of steel, and all racks and gears are cut from the solid.

The rack and driving gear are $2\frac{3}{4}$ inches wide, and 5 diametrical pitch.

The machine is run with two $1\frac{3}{4}$ inch belts, one on each side, which we consider the correct method of belting a planer, as it brings the belts close to the bearings, and prevents all liability of springing the shaft, or interference of the belts. Belt velocity, 23 feet of belt to move the table one foot.

Speed of countershaft, 210 revolutions per minute, which gives 24 per minute on cut.

Size of tight and loose pulleys on countershaft, 10 inches diameter, 3 inch face.

Return speed of table, three to one.

*Exact shipping weight: 3 feet, 2750 pounds; 4 feet, 2950 pounds.



PUTNAM METAL PLANERS.

FROM IMPROVED PATTERNS, EXTRA HEAVY, POWERFUL, SMOOTH RUNNING, QUICK RETURN,
SPIRAL DRIVING PINIONS, ETC.

GENERAL DESCRIPTION.

THESE PLANERS are extra heavy and are made from entirely new and improved patterns, no expense having been spared to make them convenient, quick and efficient machines. The operating mechanism is conveniently arranged to control the advancing and receding movements of the table. They have hand and automatic horizontal, vertical and angular feeds, universal feed in heads and extra coarse surfacing feeds.

The motive parts consist of large, triple or quadruple powered steel shafts, with strong, accurately cut gears. Racks are cut with precision. Rack pinions and shafts are made from solid steel forgings. Pulley-pinions are made with *spiral cogs*, which, together with a well-proportioned and carefully built train of gearing imparts a smooth and lasting motion to the tables which reverse without shock or jar.

Beams can be fed (under cut) down their entire distance. They have improved clamp binders for locking to posts.

Belts are operated by improved automatic shifter, which acts upon the loose pulley in advance of the other, thereby preventing excessive wear to belts and produces little or no noise in reversing.

Driving gears are protected by chip shields. Loose pulleys have anti-friction bushings. The improved feeding mechanism is quick acting, yet so arranged as to reduce the shock and strain common to imparting instant action to the parts while at rest; it commences and ends its work easily, accumulating its full velocity in the middle of the stroke.

Beams, saddles, heads and posts are scraped to surface plates when being fitted. Screws, rods and shafts are of steel; nuts, etc., are case hardened. Elevating screws have hardened points and adjustable steel steps to preserve the original accuracy of the beam.

Tables are heavy, well ribbed and have pockets at each end; drilled and reamed bolt holes, also admit of three longitudinal T slots without impairing their rigidity.

Beds are thoroughly braced and have oil pockets at each end of the "ways."

Material and workmanship is of the best quality.

Furnished with countershaft complete, also with wrenches.

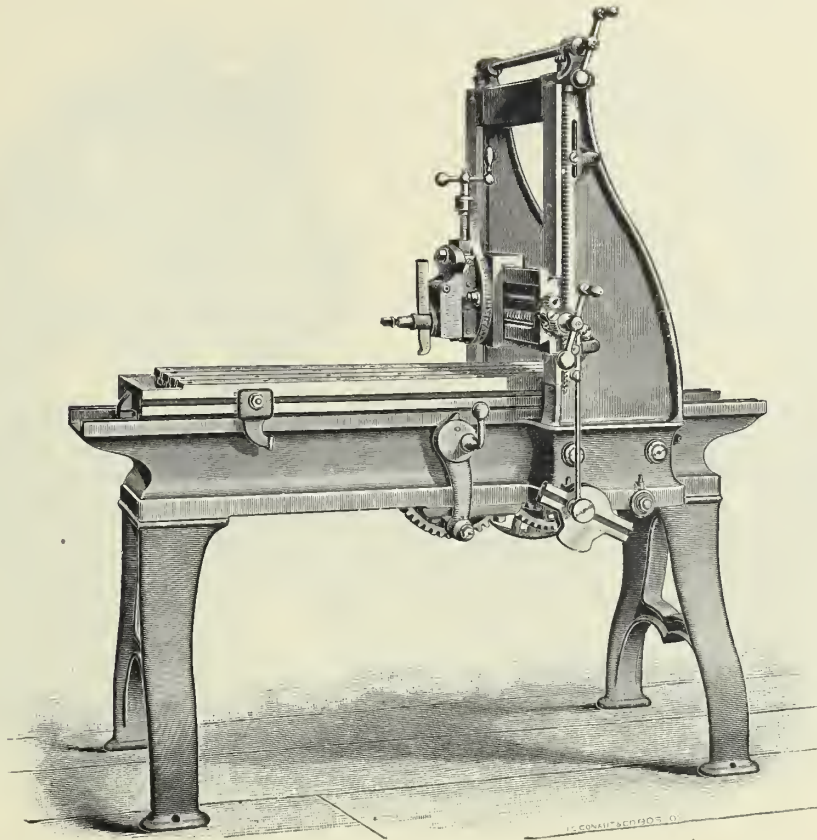
The 30, 36, 42, 48, 54, 60, 72, 84, 100, and 120 inch have improved *power attachment* for raising and lowering the cross beams (which are gibbed to the posts), by which means the operator can adjust the beam to any desired height without tightening or loosening of screws.

Besides the regular sizes herein catalogued, *special widths and lengths* are made to order. In all cases the figures given as lengths of platen are the distances *between pockets*, and the weights given are approximated.

NOTE.—Special Attention is called to the *beam feed* feature of these Planers. For vertical (cutting down) feeds, and especially for *fits*, we advocate this system as superior to that of the *head feed*. It produces better and more reliable work and is a source of economy where accuracy and good work are required.

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FIG. 160.



16 INCH PUTNAM METAL PLANER.

PLANES 16 INCHES HIGH, 18 INCHES WIDE, $3\frac{1}{2}$ FEET LONG.

THIS PLANER is a convenient, quick and efficient machine, has automatic, horizontal, vertical and angular feeds, universal feed in head, and an extra coarse surfacing feed.

The racks and all gears are cut, which, with large steel driving shafts, produce a smooth and lasting movement to the motive parts.

Beam, saddle and head are scraped to surface plates when being fitted.

Table has pockets at each end, drilled and reamed bolt holes, also three **T** slots.

Shipper has provision for quick return of table, and has spring pawl on the advancing dog, which allows the table and dog to pass without the possibility of lifting the table.

Screws are made of steel; nuts, etc., are case-hardened. Elevating screws have adjustable steel steps to preserve the original accuracy of the beam.

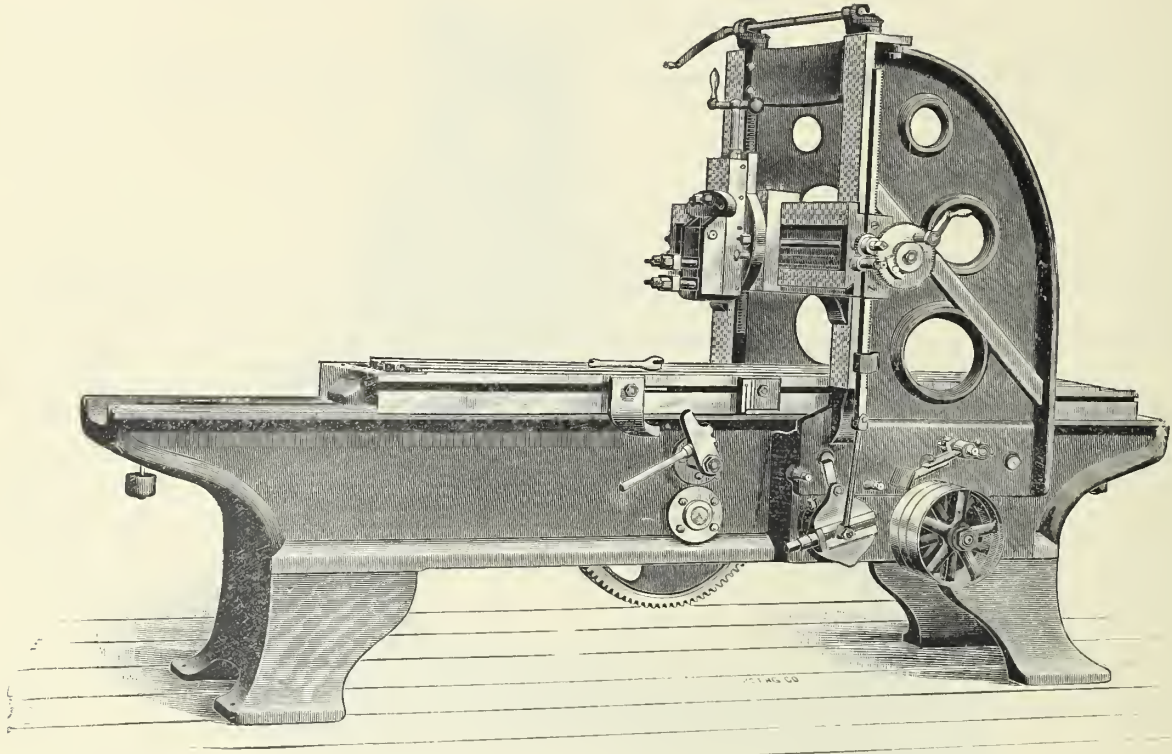
Furnished with countershaft complete, also with wrenches.

Tight and loose pulleys on countershaft, 8 inches diameter, $3\frac{3}{4}$ inch face. Countershaft should make 132 revolutions per minute.

Weight, 1950 pounds.

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FIG. 161.



20 INCH L. W. POND METAL PLANER.

PLANES $20\frac{1}{2}$ INCHES WIDE, $20\frac{1}{2}$ INCHES HIGH, BY 4 FEET LONG.

THE accompanying cut is an exact reproduction from photograph of the new pattern 20 inch Planer. The bed is extra deep, heavy and substantial. Length of bed, 6 feet 8 inches.

Extreme length of table, 5 feet, with three T slots and 4 rows of $\frac{3}{4}$ -inch holes drilled and reamed in same. Length between pockets, 4 feet. Width of table, 17 inches.

It has a friction feed from 0 to $\frac{5}{8}$ inch, and will feed horizontally, vertically, or at any angle.

All shafting and screws are made of steel, and all racks and gears are cut from the solid.

The rack and driving gear are $2\frac{3}{4}$ inches wide, and 5 diametrical pitch.

The machine is run with two $1\frac{3}{4}$ inch belts, one on each side, which we consider the correct method of belting a planer, as it brings the belts close to the bearings, and prevents all liability of springing the shaft. Belt velocity, 23 feet of belt to move the table one foot.

Speed of countershaft, 210 revolutions per minute, which gives 24 per minute on cut.

Size of tight and loose pulleys on countershaft, 10 inches in diameter $3\frac{1}{2}$ -inch face.

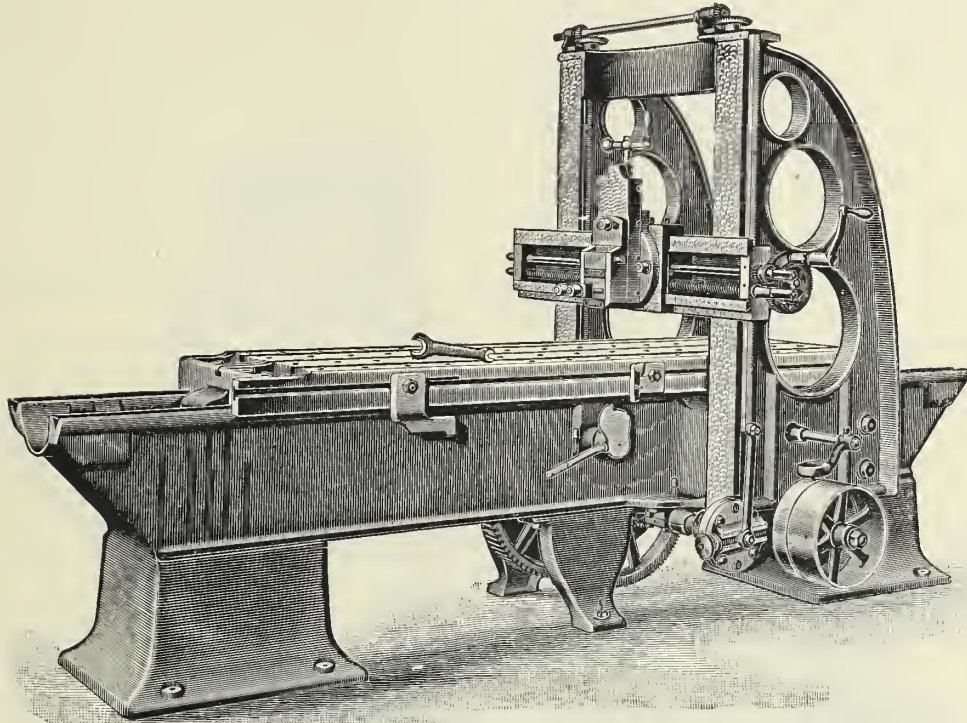
Return speed of table, three to one.

Exact shipping weight : 4 feet, 3350 pounds ; 5 feet, 3600 pounds.

For additional description, see page 162.

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FIG. 162.



22 INCH L. W. POND METAL PLANER.

THE above illustrated Planer is built from new patterns, and combines many new and improved features. It planes $22\frac{1}{2}$ inches wide by $22\frac{1}{2}$ inches high by 6 feet.

The bed is extra deep, heavy and substantial, resting on cabinet legs, with middle legs provided with leveling screws. Length of bed, 10 feet.

The Table.—Extreme length of table, 7 feet, with three **T** slots, and four rows of $\frac{3}{4}$ inch holes drilled and reamed in same. Length between pockets, 6 feet, and by using holes in the end of the table, will plane 7 feet. Width of table, 18 inches. It has a friction feed from 0 to $\frac{3}{4}$ inches, and will feed horizontally, vertically, or at any angle.

All shafting and screws are made of steel, and all racks and gears are cut from the solid.

The rack and driving gear are $2\frac{3}{4}$ inches wide, and 4 diametrical pitch.

The machine is run with two $1\frac{3}{4}$ inch belts, one on each side, which we consider the correct method of belting a planer, as it brings the belts close to the bearings, and prevents all liability of springing the shaft. Belt velocity, 30 feet of belt to move the table one foot.

Speed of countershaft, 280 revolutions per minute, which gives 24 feet per minute on cut.

Size of tight and loose pulleys on countershaft, 10 inches diameter, 4 inch face.

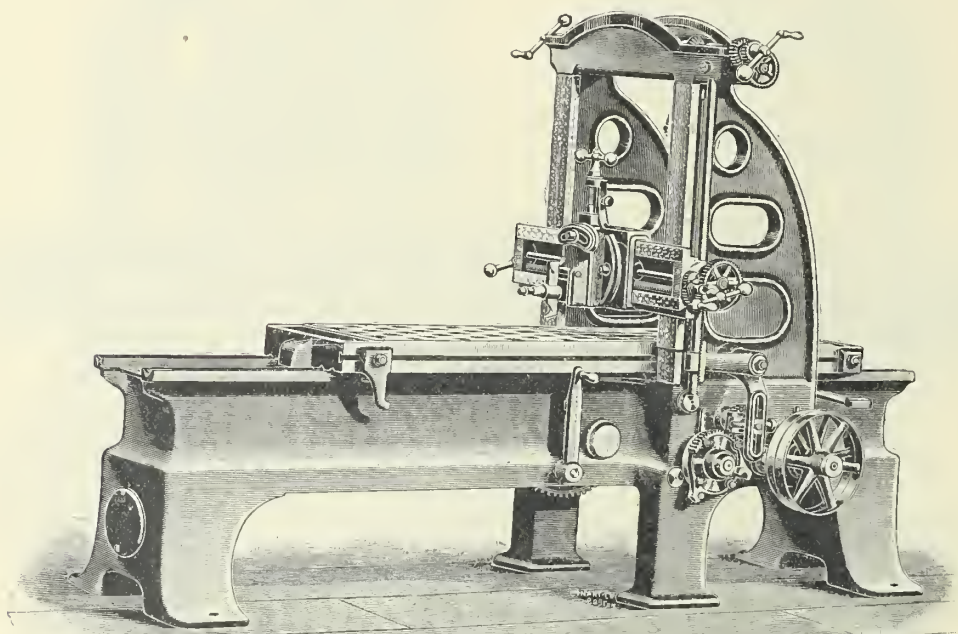
Return speed of table, three to one.

Exact shipping weight : 4 feet, 3700 pounds ; 5 feet, 4000 pounds ; 6 feet, 4300 pounds.

For additional description see page 162.

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FIG. 163.



22 INCH PUTNAM METAL PLANER.

PLANES 22½ INCHES WIDE, 22½ INCHES HIGH.

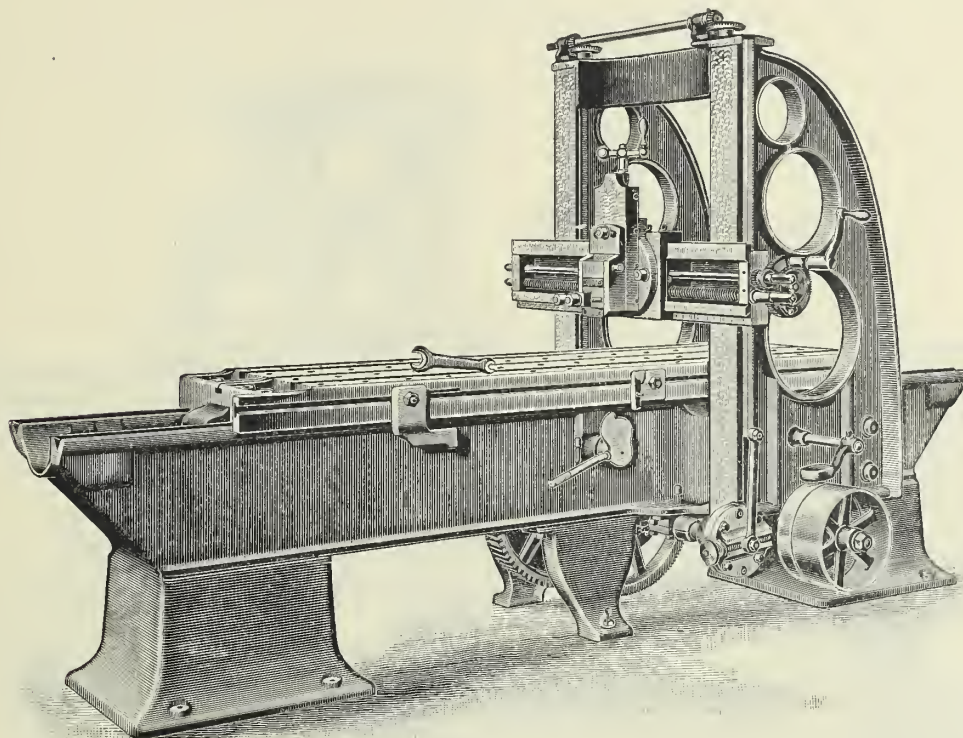
Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
22 inches.	22 inches.	4 feet.	7 feet 4 inches.	4450
22 "	22 "	5 "	9 "	4850
22 "	22 "	6 "	10 " 8 "	5250
22 "	22 "	7 "	12 " 4 "	5650

Tight and loose pulleys on countershaft 8 inches diameter, 4 inch face.
Countershaft should make 290 revolutions per minute.

For general description, see page 164.

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FIG. 164.



24 INCH L. W. POND METAL PLANER.

THE above illustrated Planer is built from new patterns, and combines many new and improved features. It planes $24\frac{1}{2}$ inches wide by $24\frac{1}{2}$ inches high by 6 feet.

The Bed is extra deep, heavy and substantial, resting on cabinet legs, with middle legs provided with leveling screws. Length of bed, 10 feet.

The Table.—Extreme length of table, 7 feet, with three T slots, and four rows of $\frac{1\frac{3}{8}}$ inch holes drilled and reamed in same. Length between pockets, 6 feet, and by using holes in the end of the table will plane 7 feet. Width of table, 20 inches. It has a friction feed from 0 to $\frac{3}{4}$ inch, and will feed horizontally, vertically, or at any angle.

All shafting and screws are made of steel, and all racks and gears are cut from the solid.

The rack and driving gear are 3 inches wide, and 4 diametrical pitch.

The machine is run with two 2 inch belts, one on each side, which we consider the correct method of belting a planer, as it brings the belts close to the bearings, and prevents all liability of springing the shaft, or interference of the belts. Belt velocity, 30 feet of belt to move the table one foot.

Speed of countershaft, 260 revolutions per minute, which gives 23 feet per minute on cut.

Size of tight and loose pulleys on countershaft, 10 inches diameter, 4 inch face.

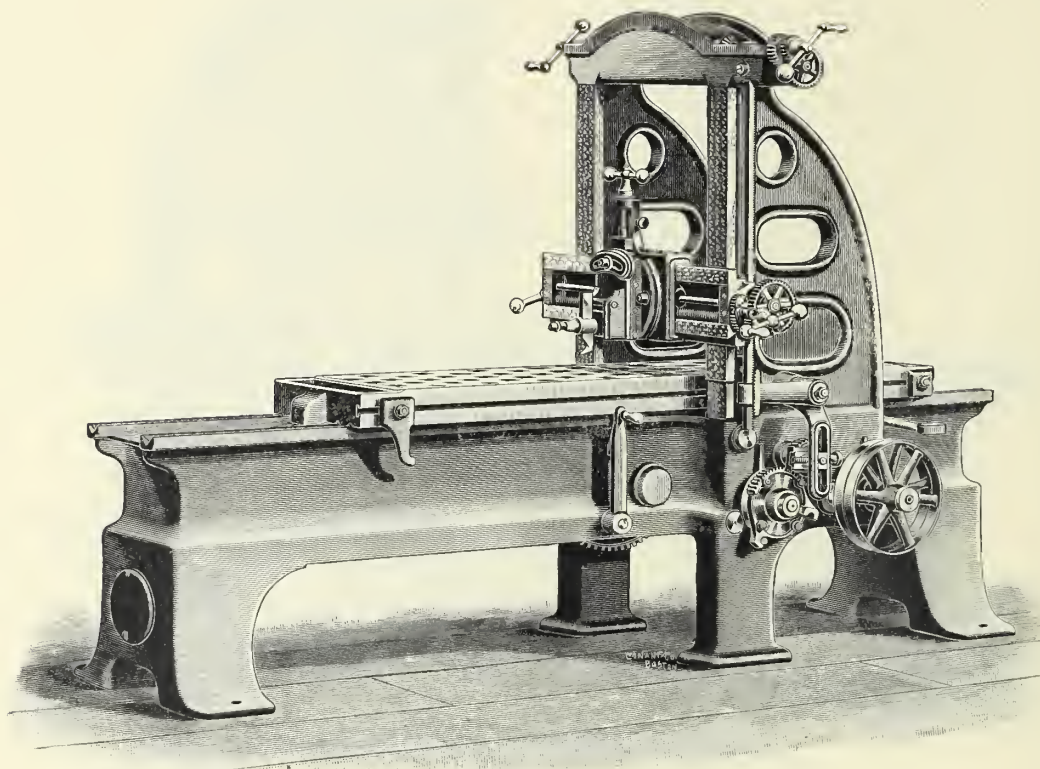
Return speed of table, three to one.

Exact shipping weight, 5 feet, 4600; 6 feet, 5000; 7 feet, 5400; 8 feet, 5800 pounds.

For additional description, see page 162.

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FIG. 165.



24 INCH PUTNAM METAL PLANER.

PLANES 24½ INCHES WIDE, 24½ INCHES HIGH.

Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
24 inches.	24 inches.	5 feet.	8½ feet.	6300
24 "	24 "	6 "	10 "	7044
24 "	24 "	7 "	11½ "	7357
24 "	24 "	8 "	13 "	7670

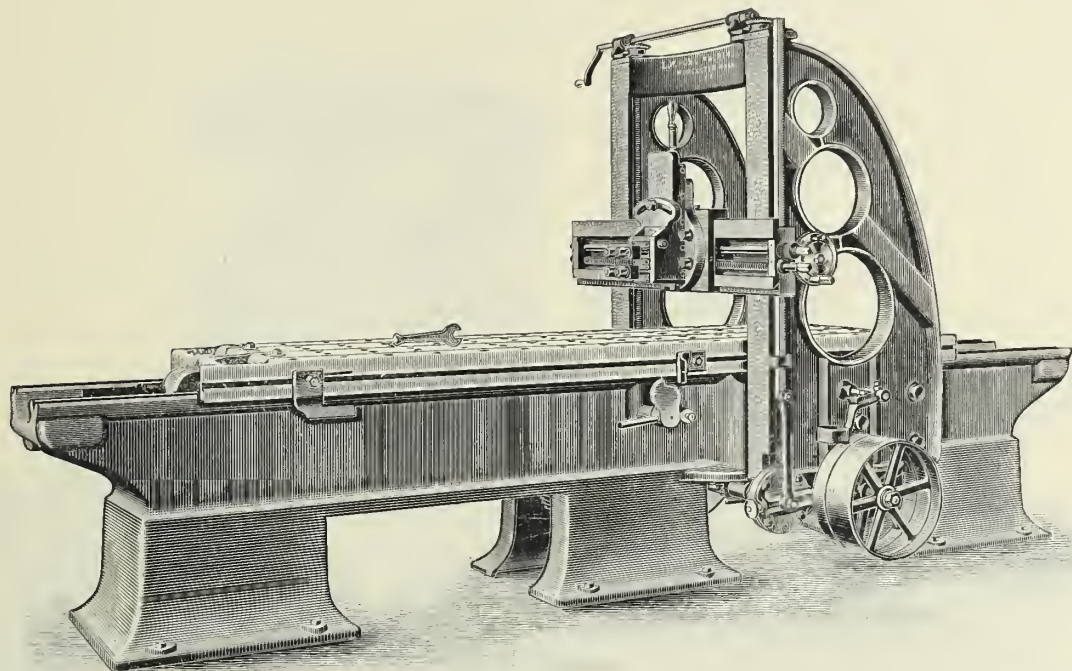
Tight and loose pulleys on countershaft, 12 inches diameter, 4½ inch face.

Countershaft should make 265 revolutions per minute.

For general description, see page 164.

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FIG. 166.



28 INCH L. W. POND METAL PLANER.

THE new pattern 28-inch Planer, of which the accompanying cut is an exact reproduction from photograph, and an entirely new departure from the tools heretofore built, has some features never before adopted by builders of iron Planers.

The bed is extra deep, heavy and substantial, resting on new style cabinet legs, affording extra large bearing surface on floor, and giving great steadiness to machine when in operation. This is a very desirable feature, especially where tools go on upper floors.

This tool has a very quick return for table, and is provided with a quick return of 4 to 1 on end of bar, saving operator much time and exertion in carrying head across.

All Planers of this size are fitted with automatic rack feed, powerful and compact, driven by a steady friction of new design, giving a feed of from 0 to $1\frac{1}{2}$ inches at a very little expenditure of power.

The gearing is all placed inside of bed, and is so fitted that a very quick return is obtained without any faster speed of shafting than in old style slow return Planers, and runs without jar or rattle.

Pulleys are extra large diameter, giving large area of belt surface and high speed of belting.

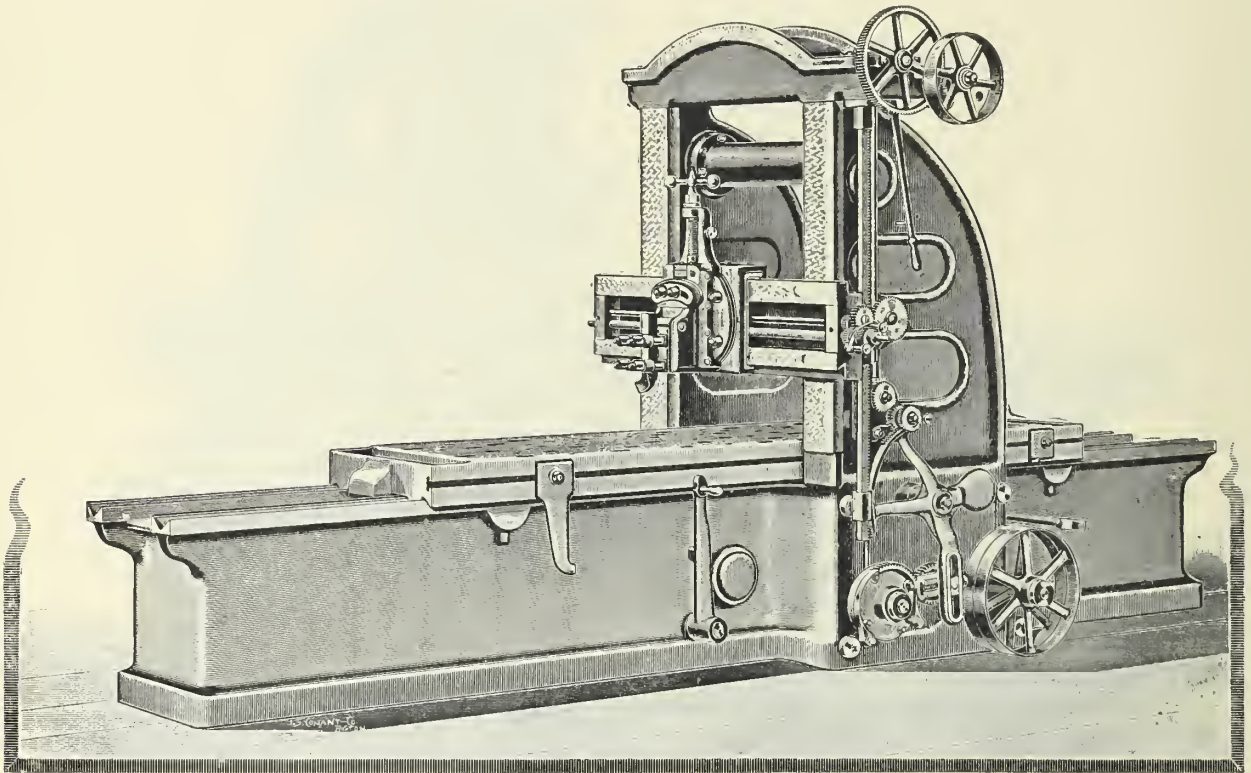
All bearings for shafts are bored with jigs fitted to V's of bed, and are fitted with eccentric bushings so adjusted that shafts and gearing run easily and noiselessly. This is an important feature in construction of Planers having so fast a return.

This Planer is most handsomely designed, strongly built, and material and workmanship throughout is of the very best quality.

Shipping weight : 6 feet, 7000 pounds ; 8 feet, 8000 pounds ; 10 feet, 9000 pounds.

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FIG. 166.



30 INCH PUTNAM METAL PLANER.

PLANES 31 INCHES WIDE, 32 INCHES HIGH.

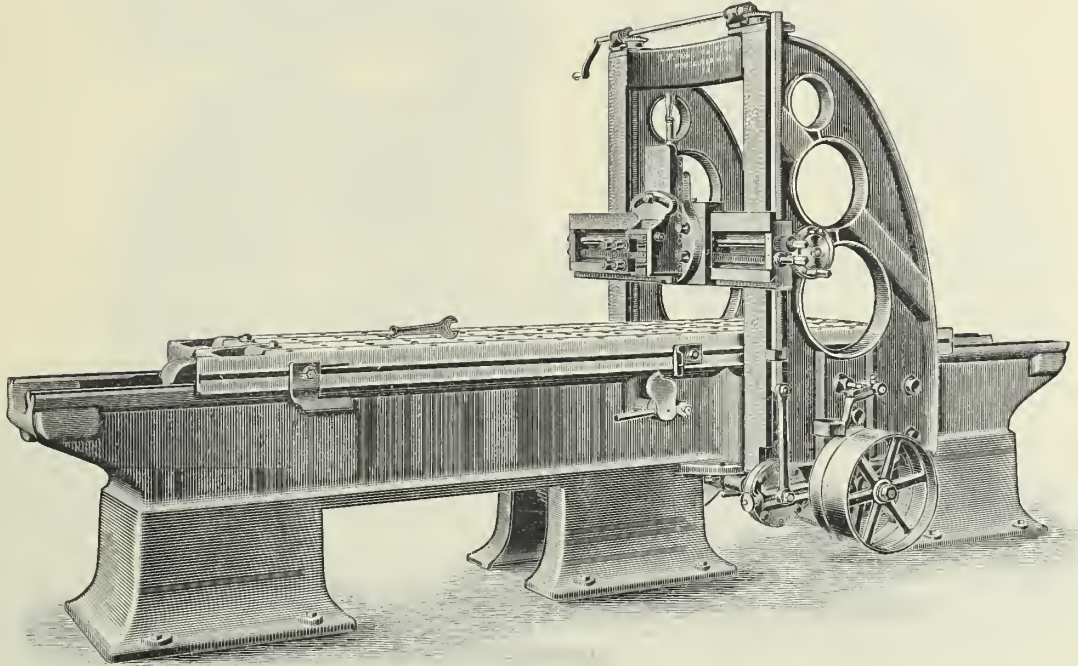
Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
30 inches.	30 inches.	8 feet.	13 feet 4 inches.	14176
30 "	30 "	10 "	16 " 8 "	16314
30 "	30 "	12 "	20 " 4 "	17828
30 "	30 "	14 "	23 " 8 "	19500
30 "	30 "	16 "	26 " 8 "	21200
30 "	30 "	18 "	30 " 8 "	22900

Tight and loose pulleys on countershaft, 12 inches diameter, $4\frac{1}{2}$ inch face.
Countershaft should make 310 revolutions per minute.

For general description see page 161.

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FIG. 167.



32 INCH L. W. POND METAL PLANER.

THE new pattern 32 inch Planer, illustrated above, is an exact reproduction from photograph, and an entirely new departure from tools of this class heretofore built.

The bed is extra deep, heavy and substantial, resting on new style cabinet legs, affording extra large bearing surface on floor, and giving great steadiness to the machine when in operation.

It has a very quick return for table and is provided with a quick return of 4 to 1 on end of bar, saving the operator much time and exertion in carrying head across.

All planers of this size are fitted with automatic rack feed, powerful and compact, driven by a steady friction of new design.

The gearing is all placed inside of bed, and is so fitted that a very quick return is obtained without any faster speed of shafting than in old style slow return planers, and runs without jar or rattle.

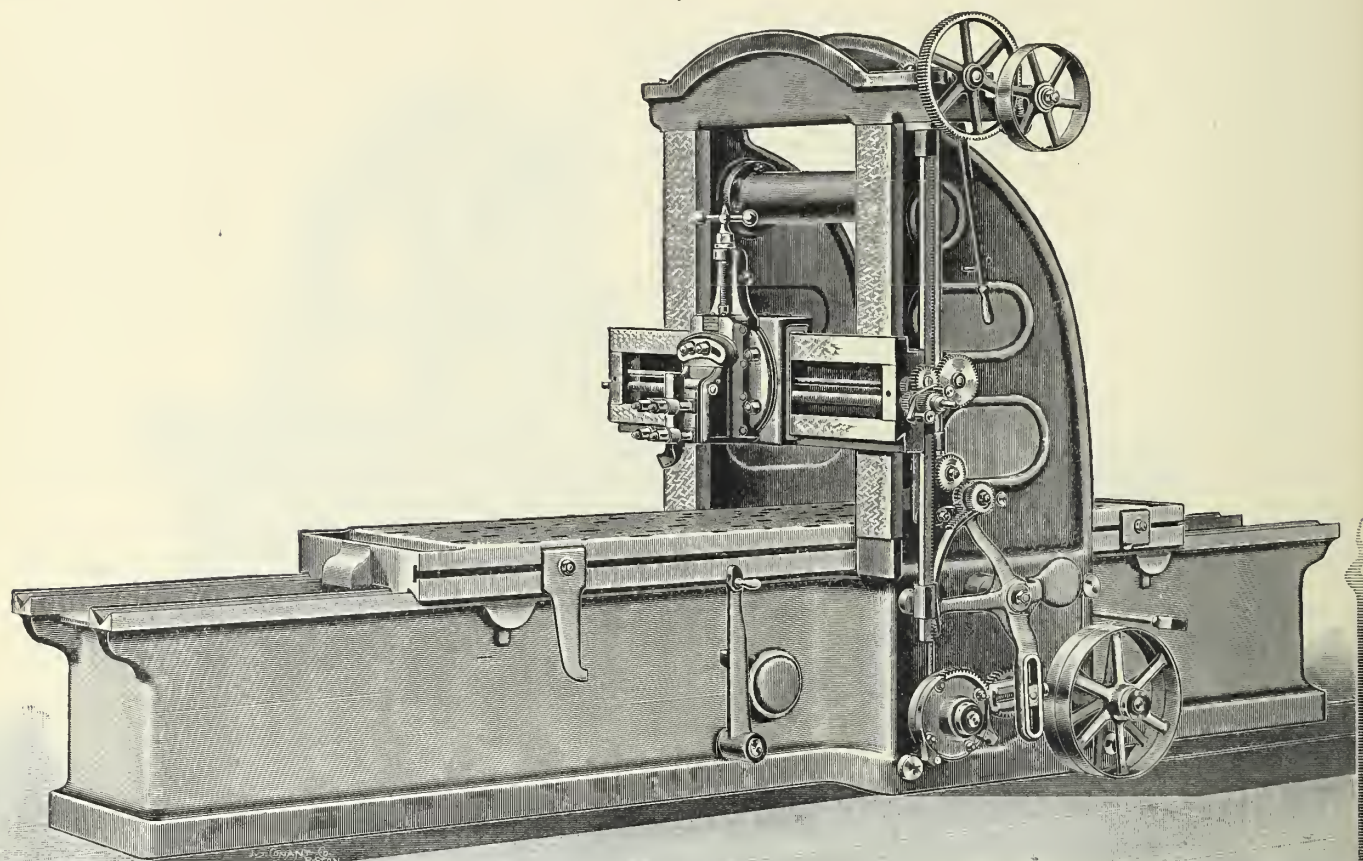
The pulleys are extra large, diameter giving large area of belt surface and high speed of belting.

All bearings for shafts are bored with jigs fitted to V's of bed, and are fitted with eccentric bushings so adjusted that shafts and gearing run easily and noiselessly.

Shipping weight : 8 feet, 11000 pounds ; 10 feet, 12000 pounds ; 12 feet, 14200 pounds.

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FIG. 169.



36 INCH PUTNAM METAL PLANER.

PLANES $37\frac{1}{4}$ INCHES WIDE, $37\frac{1}{4}$ INCHES HIGH.

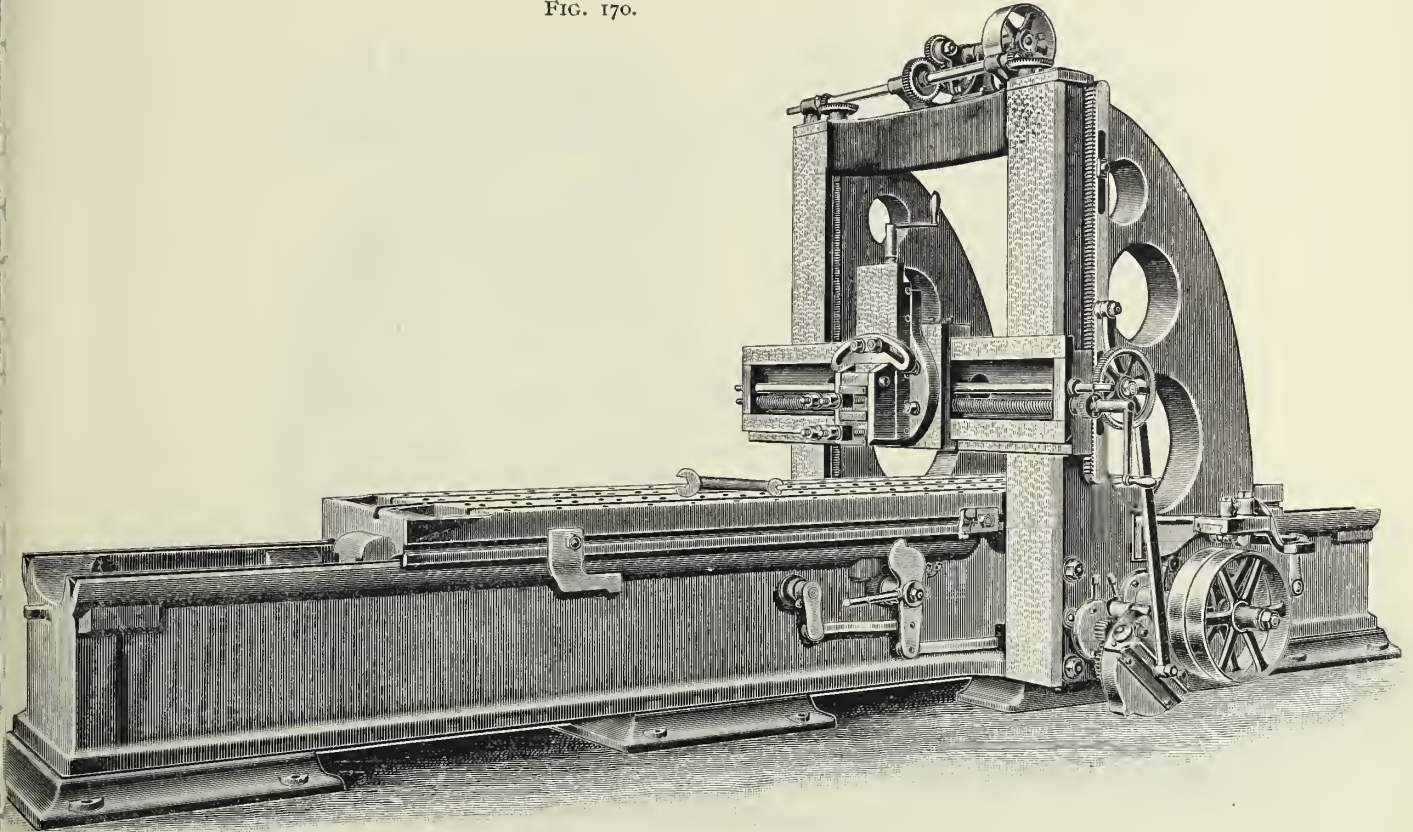
Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
36 inches	36 inches	8 feet	15 feet	21180
36 "	36 "	10 "	18 "	22330
36 "	36 "	12 "	21 "	23480
36 "	36 "	14 "	24 "	24380
36 "	36 "	16 "	27 "	25780
36 "	36 "	18 "	30 "	26930
36 "	36 "	20 "	33 "	28080

Beam head with automatic feed, and post heads with automatic feed, extra.
 Tight and loose pulleys on countershaft, 16 inches diameter, 6 inch face.
 Countershaft should make 290 revolutions per minute.

For general description see page 164.

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FIG. 170.



38 AND 44 INCH L. W. POND METAL PLANERS.

PLANES $38\frac{1}{2}$ INCHES WIDE, $38\frac{1}{2}$ INCHES HIGH. PLANES $44\frac{1}{2}$ INCHES WIDE, $44\frac{1}{2}$ INCHES HIGH.

THE cut shown herewith is an accurate reproduction from photograph of Planers built from new and improved patterns; heavy and powerful tools designed for the most trying class of work. These machines are finely proportioned, and every part is made capable of withstanding the severest strain it is liable to be subjected to.

The bed is extra deep, and of unusual length in proportion to length of table, leaving but a small part of the latter to overhang when planing at full length. It is extra wide between V's, and thoroughly braced by box girders throughout its entire length. The tracks are wide, providing a good wearing surface, with oil channels cut their entire length, which in connection with our improved oiling device, ensures constant and perfect lubrication.

The table is very heavy, of more than ordinary thickness, and of full length between pockets. Holes are drilled and reamed from solid stock. Slots planed entire length.

Uprights are very massive, strongly ribbed, and have wide face. Cross bar is especially strong and heavy, is well supported on back, and firmly bolted to uprights. All head work is made to correspond in weight and strength with other parts, and all working parts are carefully scraped to surface plates, and are made to fit accurately.

Shafting is made of the finest quality steel, large diameter, fitted to extra long bearings, and all bearings are so adjusted that shafting and gearing run easily and noiselessly.

All racks and gearing are cut from solid stock, and designed for the heaviest and most trying work. All pinions are made of forged steel.

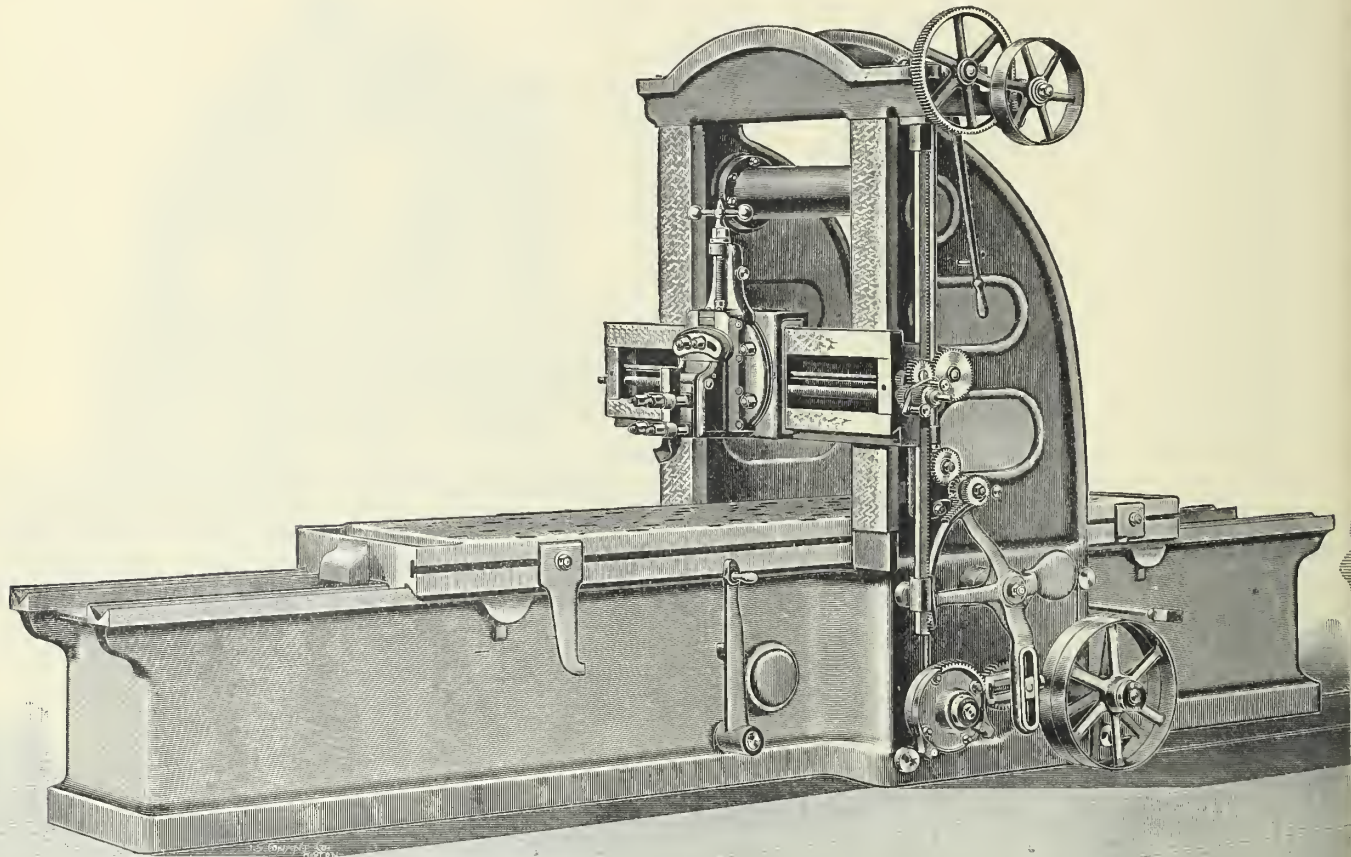
The shipping device is on the cam motion principal, so constructed that all the principal parts are outside and convenient for oiling. It also provides for one belt traveling its full distance before other starts, so that at no time shall one belt oppose the other.

These machines are fitted with improved rack feed, and this in connection with positive ratchet feed, powerful in operation, secures an accurate feed at all times. We furnish Planers of these sizes with one or two heads on cross rail and with side head on one or both uprights, as desired. Quality of material and workmanship first-class.

Shipping weight 38-inch Planer: 8 foot table, 15000 pounds; 10 foot table, 16500 pounds; 12 foot table, 19500 pounds. Shipping weight 44-inch Planer: 10 foot table, 21000 pounds; 12 foot table, 25000 pounds; 16 foot table, 30000 pounds.

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FIG. 171.



42 INCH PUTNAM METAL PLANER.

PLANES $43\frac{1}{4}$ INCHES WIDE, $43\frac{1}{4}$ INCHES HIGH.

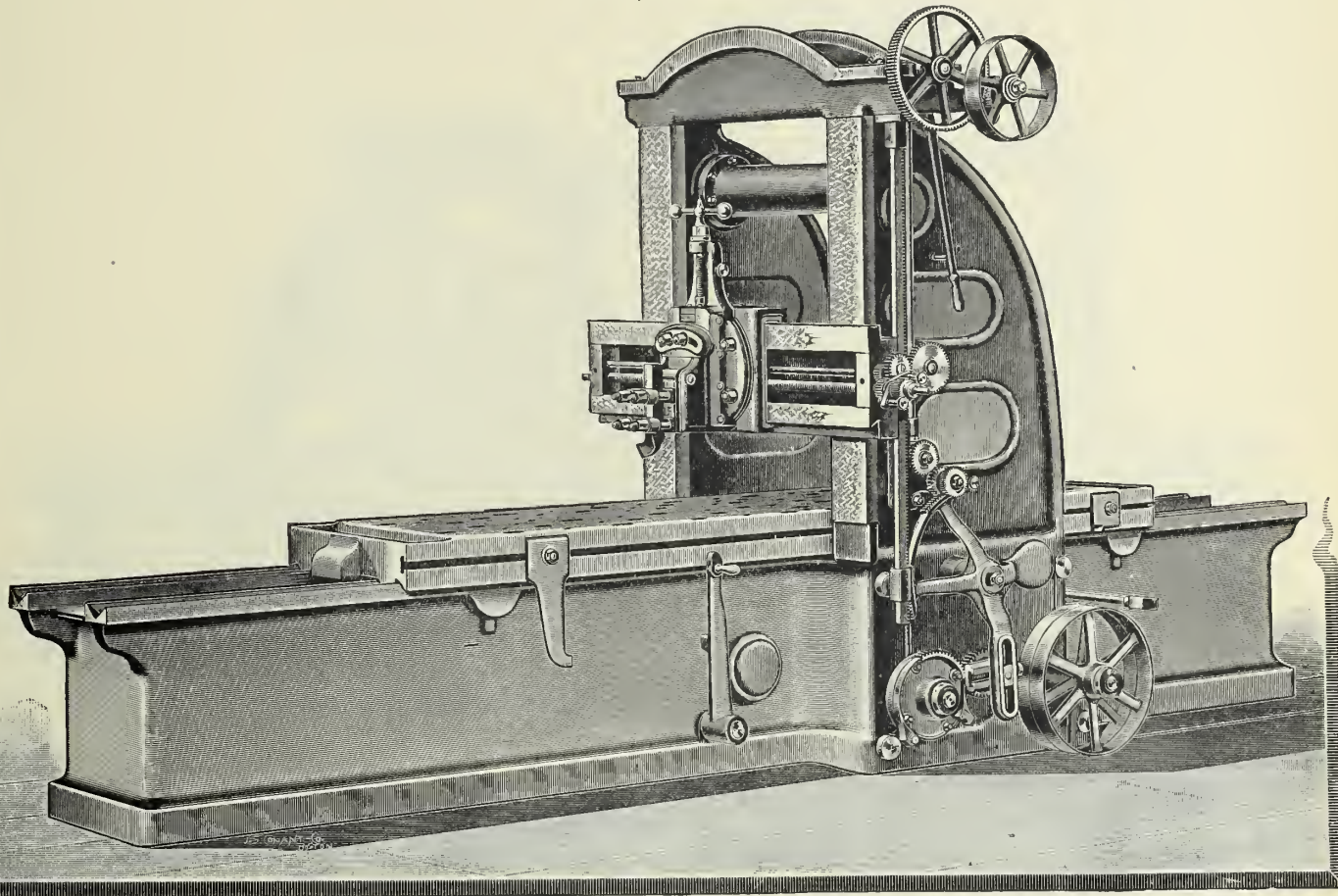
Planing Width	Planing Height.	Length of Platen.	Length of Bed	Weight.
42 inches.	42 inches.	8 feet.	14 feet 6 inches.	22330
42 "	42 "	10 "	16 " 8 "	23380
42 "	42 "	12 "	19 " 6 "	24390
42 "	42 "	14 "	21 " 8 "	25400
42 "	42 "	16 "	24 "	26410
42 "	42 "	18 "	27 "	27450
42 "	42 "	20 "	30 "	28460

Beam head with automatic feed, and post heads with automatic feed, extra.
 Tight and loose pulleys on countershaft, 16 inches diameter, 6 inch face.
 Countershaft should make 300 revolutions per minute.

For general description, see page 175.

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FIG. 172.



48 INCH PUTNAM METAL PLANER.

PLANES $49\frac{1}{4}$ INCHES WIDE, $49\frac{1}{4}$ INCHES HIGH.

Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
48 inches.	48 inches.	8 feet.	13 feet 6 inches.	22830
48 "	48 "	10 "	17 " 1 "	23890
48 "	48 "	12 "	20 " 2 "	24900
48 "	48 "	14 "	23 " 9 "	25910
48 "	48 "	16 "	26 " 10 "	26920
48 "	48 "	18 "	30 " 5 "	27930
48 "	48 "	20 "	33 " 5 "	28940
48 "	48 "	22 "	36 " 5 "	28950

Beam head with automatic feed, extra. Post heads with automatic feed, extra.

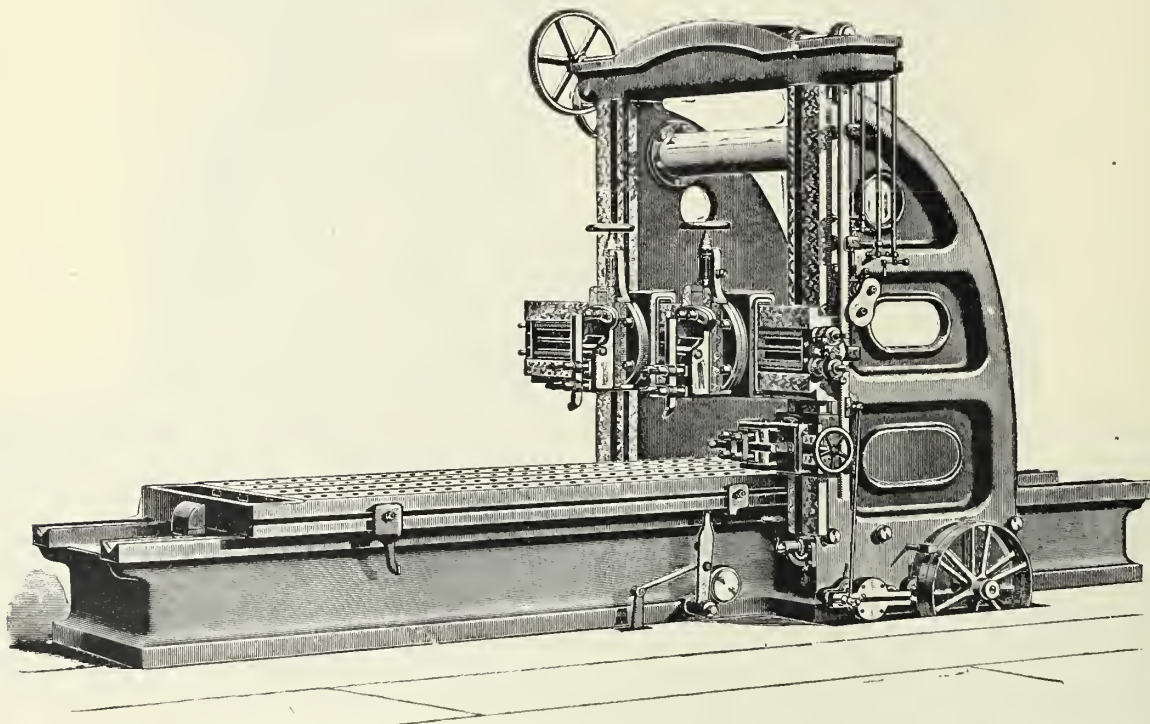
Tight and loose pulleys on countershaft, 16 inches diameter, 6 inch face.

Countershaft should make 300 revolutions per minute.

For general description, see page 164.

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FIG. 173.



54 INCH PUTNAM METAL PLANER.

PLANES $55\frac{1}{2}$ INCHES WIDE, $55\frac{1}{2}$ INCHES HIGH.

Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
54 inches	54 inches	10 feet	18 feet 2 inches	39700
54 "	54 "	12 "	21 " 10 "	41700
54 "	54 "	14 "	24 " 10 "	43700
54 "	54 "	16 "	27 " 10 "	45700
54 "	54 "	18 "	30 " 10 "	47700
54 "	54 "	20 "	34 " 10 "	49700
54 "	54 "	22 "	38 " 10 "	51700
54 "	54 "	24 "	42 " 10 "	53700

Beam head with automatic feed, and post heads with automatic feed, extra.

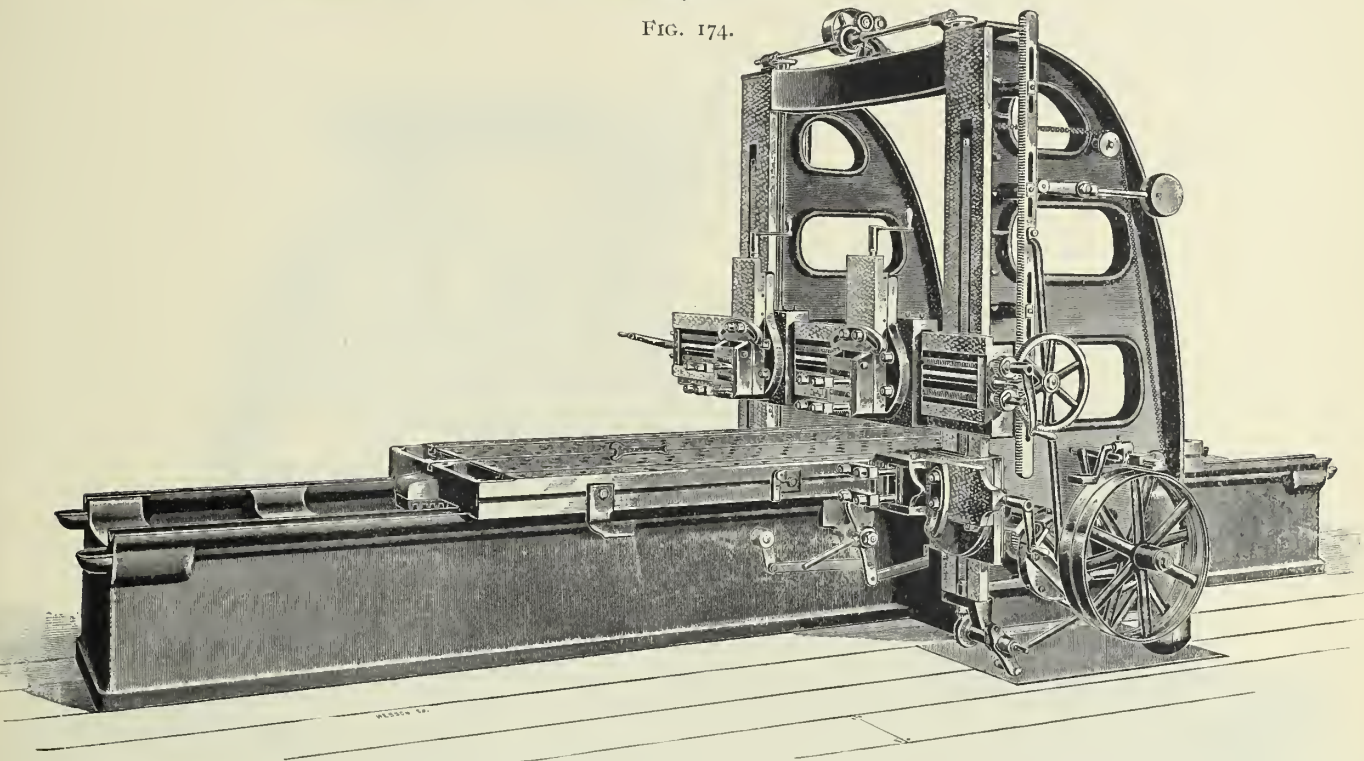
Tight and loose pulleys on countershaft, 18 inches diameter, 7 inch face.

Countershaft should make 280 revolutions per minute.

For general description, see page 164.

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FIG. 174.



60 INCH L. W. POND METAL PLANER,
ON 12 FOOT BED.

THE accompanying illustration represents one of the latest and most improved Planers of above size. These tools are made with or without the extra heads on cross bar or upright, as shown in cut.

The Bed is of unusual length in proportion to the length of the table, allowing but a small portion of the latter to overhang when working at full length of its movement. The V's are supplied with oil rolls, assuring perfect lubrication.

The Table is extra heavy, with slides of good width, giving a solid, firm bearing, and an extra wearing surface, also having an oil channel cut the entire length to ensure perfect lubrication, thus keeping the parts from cutting on heavy work. There are three bolt slots planed from the solid and running the entire length of the table. The holes in the table for the purpose of packing or holding the work firmly in place are carefully drilled and reamed to size.

The Uprights carrying the side head are very heavy, with large breadth of base, and are braced so as to prevent springing of the face when a heavy cut is being taken. These uprights are firmly bolted to the bed with large steel taper bolts, and with a large additional steel pin nicely fitted to a drilled and reamed hole in both parts, to make them doubly secure against any lateral strain.

The Driving Shafts are made of steel, fitted to extra long and large bearings, placed close to gearing, giving steadiness and smoothness to the table when carrying heavy work.

The Cross Bar is extra strong and heavy and firmly fitted to the uprights, so arranged that it can be quickly adjusted by power by means of the raise and fall screws. The slides and working parts are carefully scraped to fit.

The Feed is transmitted to the cross, down and angle screws through the driving shaft, and is supplied with patent friction arrangement which runs perfectly free and loose after having done its work at the end of the stroke.

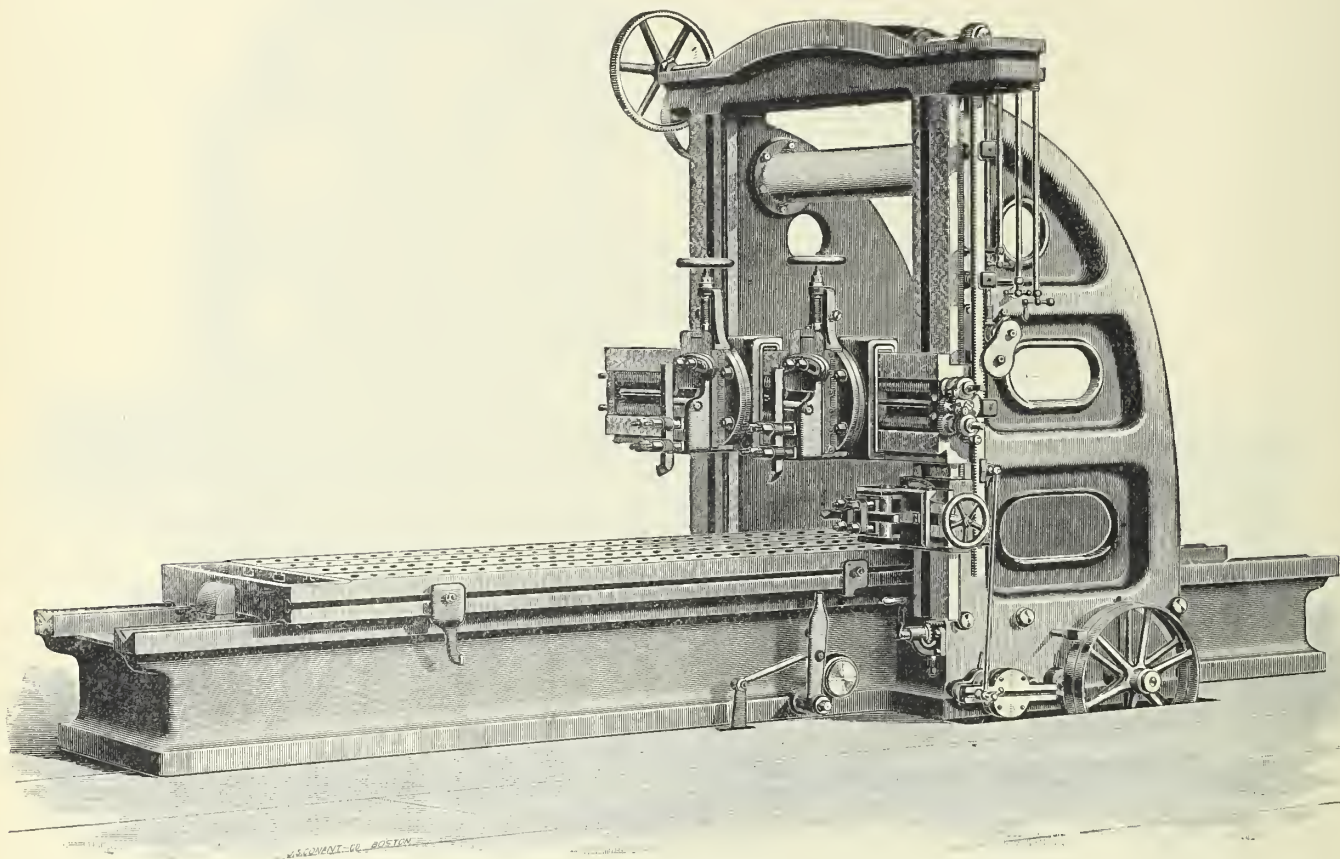
The Reversing Motion is of recent invention. By this arrangement each belt completes its work before the other starts, leaving the machine under perfect control of the operator at any part of the stroke, and prevents any unpleasant jar or jerk in reversing, and can be operated from either side of the machine.

SPECIFICATIONS.

	48 x 48	52 x 52	60 x 60	72 x 72
Size of planer,	- - - - -	- - - - -	- - - - -	- - - - -
Depth of bed,	- - - - -	- - - - -	19½	34
Width of bed between V's,	- - - - -	- - - - -	4½	50⅞
Width of V's,	- - - - -	- - - - -	53	10½
Width of table,	- - - - -	- - - - -	13¼	84
Width of post at bar,	- - - - -	- - - - -	- - - - -	- - - - -
Face of post,	- - - - -	- - - - -	- - - - -	- - - - -
Width of bar,	- - - - -	- - - - -	- - - - -	- - - - -
Feed of belt to feet of table,	- - - - -	- - - - -	- - - - -	- - - - -

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FIG. 175.



60 INCH PUTNAM METAL PLANER.

PLANES $61\frac{1}{4}$ INCHES WIDE, $61\frac{1}{4}$ INCHES HIGH.

Planing Width.	Planing Height	Length of Platen.	Length of Bed.	Weight.
60 inches.	60 inches.	10 feet.	18 feet 2 inches.	41000
60 "	60 "	12 "	21 " 10 "	43000
60 "	60 "	14 "	24 " 10 "	45000
60 "	60 "	16 "	27 " 10 "	47000
60 "	60 "	18 "	30 " 10 "	49000
60 "	60 "	20 "	34 " 10 "	51000
60 "	60 "	22 "	38 " 10 "	53000
60 "	60 "	24 "	42 " 10 "	55000

Beam head with automatic feed, and post heads with automatic feed, extra.

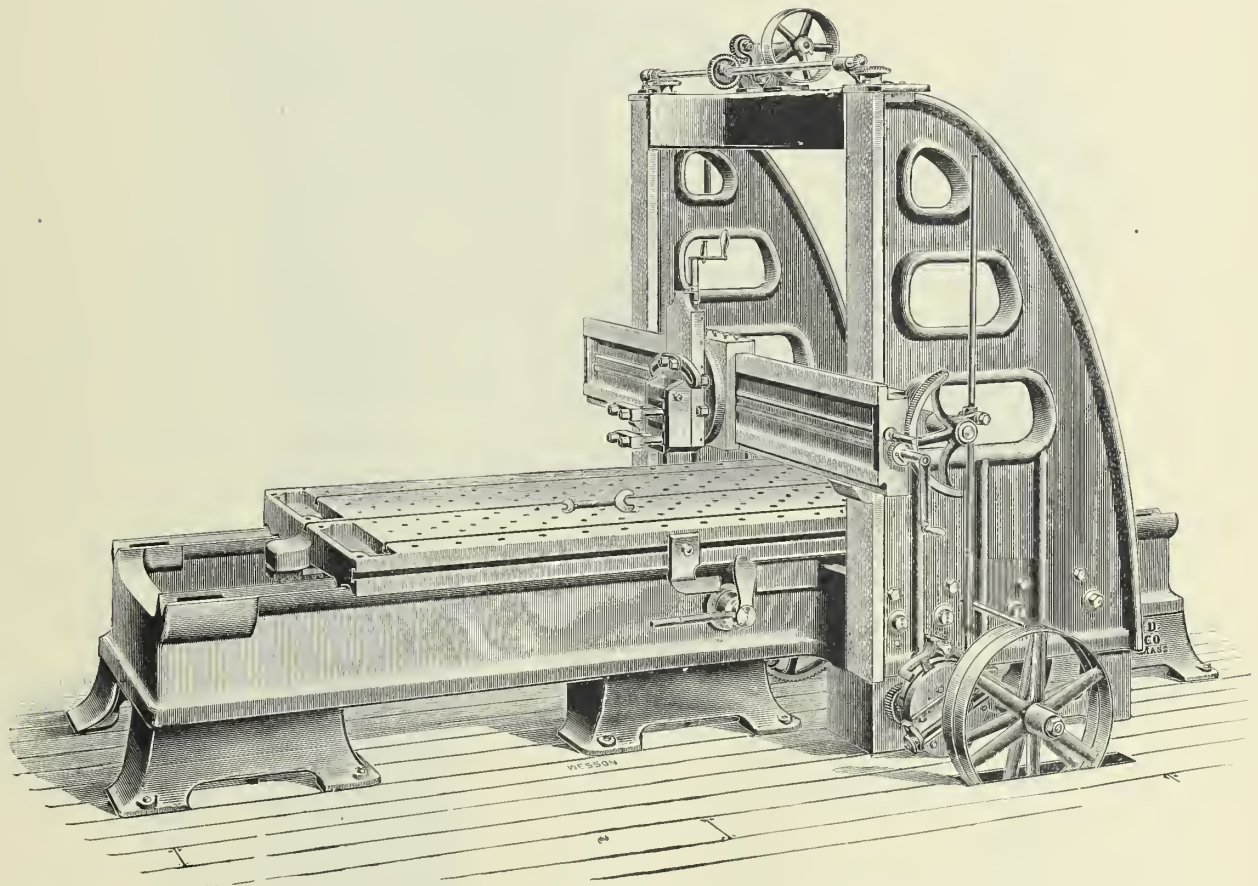
Tight and loose pulleys on countershaft, 18 inches diameter, 7 inch face.

Countershaft should make 280 revolutions per minute.

For general description, see page 164.

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FIG. 176.

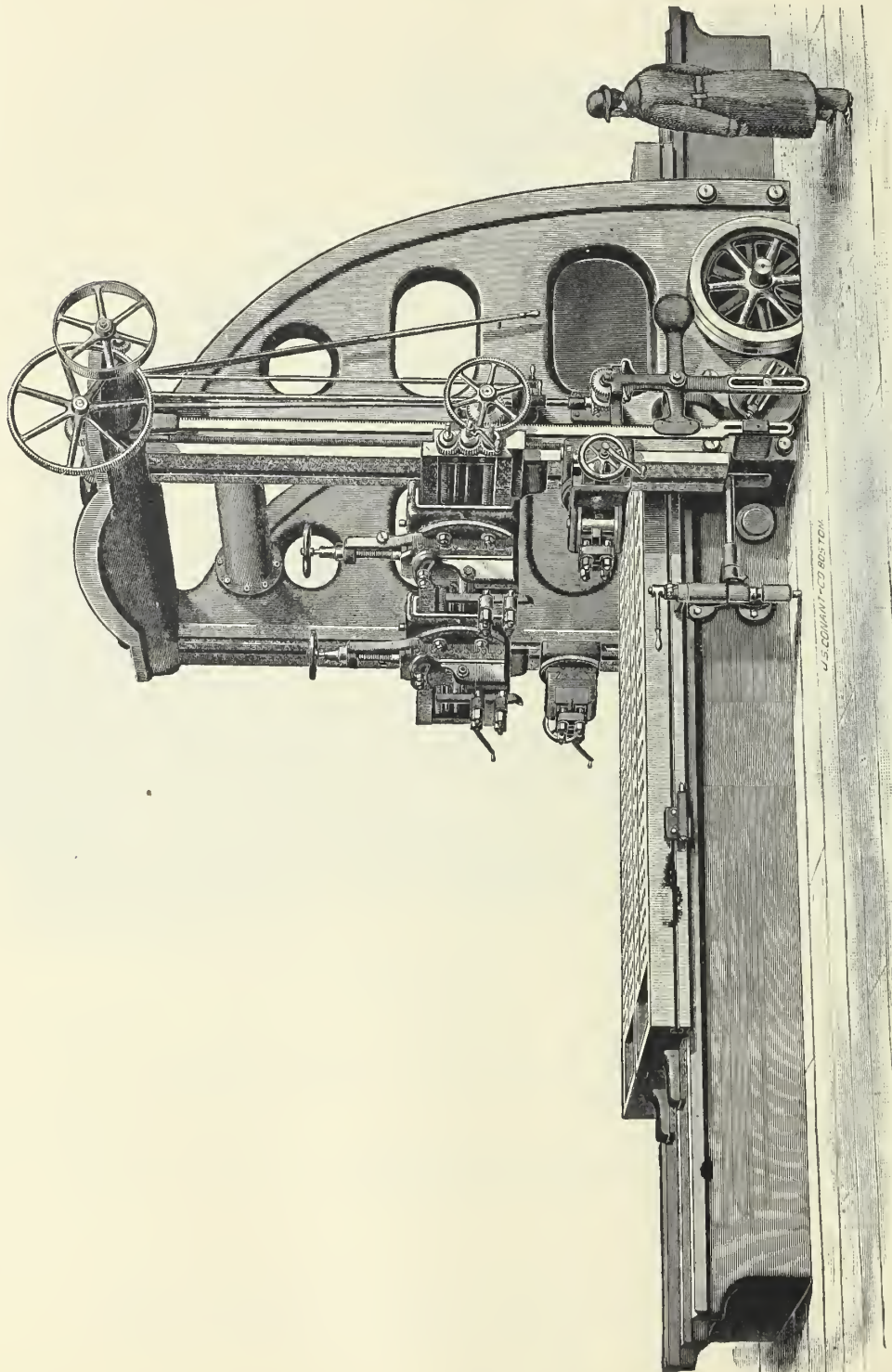


66 X 44 INCH SPECIAL PATTERN METAL PLANER.

THESE PLANERS are made in the following sizes: 50 x 44, 60 x 44, 66 x 44, and 72 x 44 inches, with any length of table desired. Full particulars and specifications will be sent on application.

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FIG. 177.



72 INCH PUTNAM METAL PLANER.

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72 INCH PUTNAM METAL PLANER.

PLANES 73½ INCHES WIDE, 73½ INCHES HIGH.

Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
72 inches	72 inches	10 feet	20 feet	67500
72 "	72 "	12 "	23 " 4 inches	71500
72 "	72 "	14 "	26 " 8 "	75500
72 "	72 "	16 "	30 "	79500
72 "	72 "	18 "	33 " 4 "	83500
72 "	72 "	20 "	36 " 8 "	87500
72 "	72 "	22 "	40 "	91500
72 "	72 "	24 "	43 " 4 "	95500
72 "	72 "	26 "	46 " 8 "	99500
72 "	72 "	28 "	50 "	103500
72 "	72 "	30 "	53 " 4 "	107500
72 "	72 "	32 "	56 " 8 "	111500
72 "	72 "	34 "	60 "	115500
72 "	72 "	36 "	63 " 4 "	119500
72 "	72 "	38 "	66 " 8 "	123500
72 "	72 "	40 "	70 "	127500

Beam head with automatic feed, and post heads with automatic feed, extra.

Tight and loose pulleys on countershaft, 22 inches diameter, 8 inch face.

Countershaft should make 280 revolutions per minute.

84 INCH PUTNAM METAL PLANER.

PLANES 85½ INCHES WIDE, 85½ INCHES HIGH.

Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
84 inches.	84 inches.	10 feet.	20 feet.	68500
84 "	84 "	12 "	23 " 4 inches.	72500
84 "	84 "	14 "	26 " 8 "	76500
84 "	84 "	16 "	30 "	80500
84 "	84 "	18 "	33 " 4 "	84500
84 "	84 "	20 "	36 " 8 "	88500
84 "	84 "	22 "	40 "	92500
84 "	84 "	24 "	43 " 4 "	96500
84 "	84 "	26 "	46 " 8 "	100500
84 "	84 "	28 "	50 "	104500
84 "	84 "	30 "	53 " 4 "	108500
84 "	84 "	32 "	56 " 8 "	112500
84 "	84 "	34 "	60 "	116500
84 "	84 "	36 "	63 " 4 "	120500
84 "	84 "	38 "	66 " 8 "	124500
84 "	84 "	40 "	70 "	128500

Beam head with automatic feed, and post heads with automatic feed, extra.

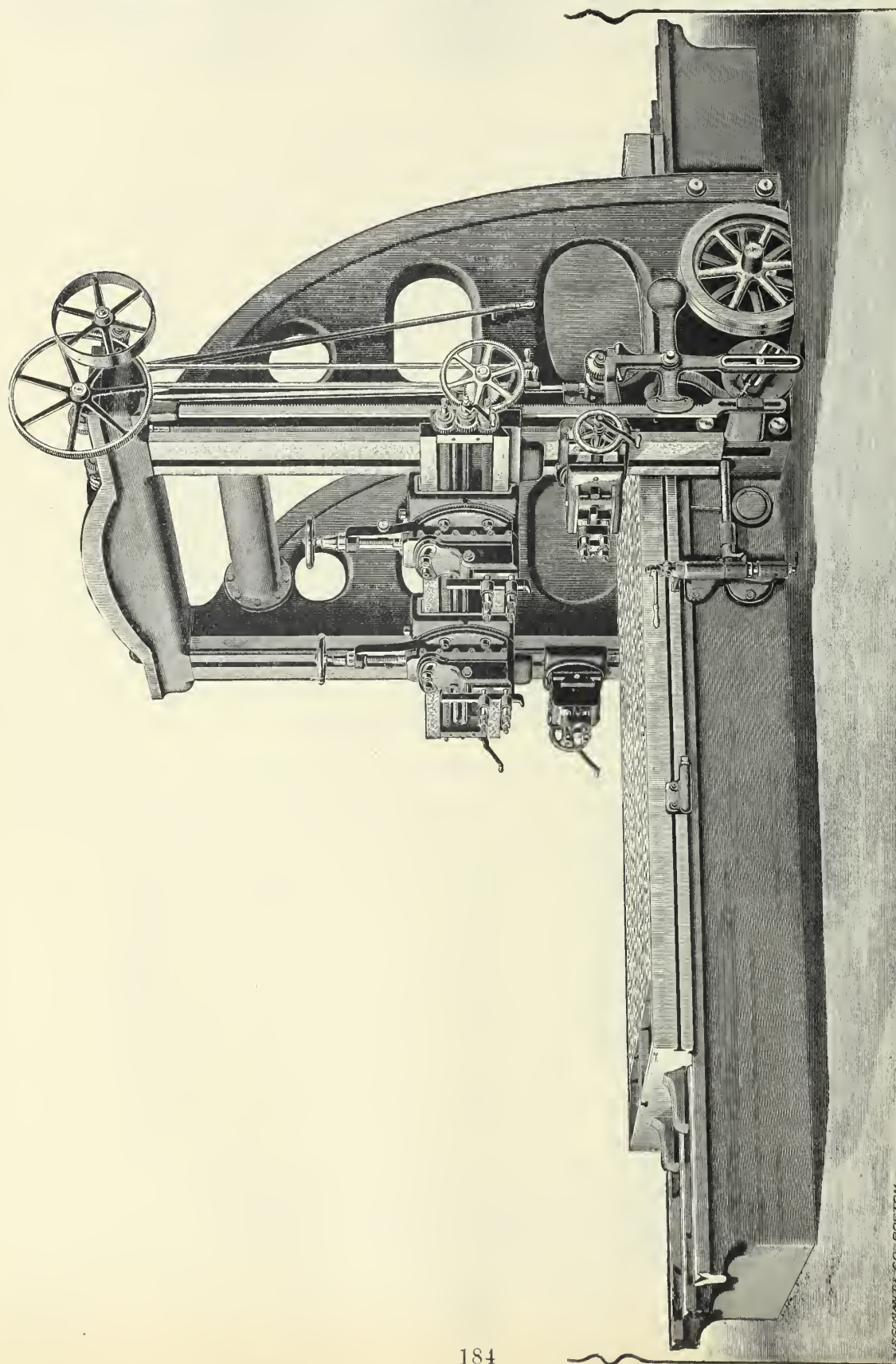
Tight and loose pulleys on countershaft, 22 inches diameter, 8 inch face.

Countershaft should make 280 revolutions per minute.

For general description, see page 164.

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FIG. 178.



100 INCH PUTNAM METAL PLANER.

WESCHMUTH & CO. BOSTON.



100 INCH PUTNAM METAL PLANER.

Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
100 inches	100 inches	12 feet	21 feet	123435
100 "	100 "	14 "	24 "	133435
100 "	100 "	16 "	27 "	143435
100 "	100 "	18 "	30 "	153435
100 "	100 "	20 "	34 "	163435
100 "	100 "	22 "	38 "	173435
100 "	100 "	24 "	42 "	183435
100 "	100 "	26 "	46 "	193435
100 "	100 "	28 "	50 "	203435
100 "	100 "	30 "	54 "	213435
100 "	100 "	32 "	58 "	223435
100 "	100 "	34 "	62 "	233435
100 "	100 "	36 "	66 "	243435
100 "	100 "	38 "	70 "	253435
100 "	100 "	40 "	74 "	263435

Beam head with automatic feed, and post heads with automatic feed, extra.

Tight and loose pulleys on countershaft, 24 inches diameter, 8 inch face.

Countershaft should make 280 revolutions per minute.

120 INCH PUTNAM METAL PLANER.

Planing Width.	Planing Height.	Length of Platen.	Length of Bed.	Weight.
120 inches.	100 inches.	12 feet.	21 feet.	128435
120 "	100 "	14 "	24 "	138435
120 "	100 "	16 "	27 "	148435
120 "	100 "	18 "	30 "	158435
120 "	100 "	20 "	34 "	168435
120 "	100 "	22 "	38 "	178435
120 "	100 "	24 "	42 "	188435
120 "	100 "	26 "	46 "	198435
120 "	100 "	28 "	50 "	208435
120 "	100 "	30 "	54 "	218435
120 "	100 "	32 "	58 "	228435
120 "	100 "	34 "	62 "	238435
120 "	100 "	36 "	66 "	248435
120 "	100 "	38 "	70 "	258435
120 "	100 "	40 "	64 "	268435

Beam head with automatic feed, and post heads with automatic feed, extra.

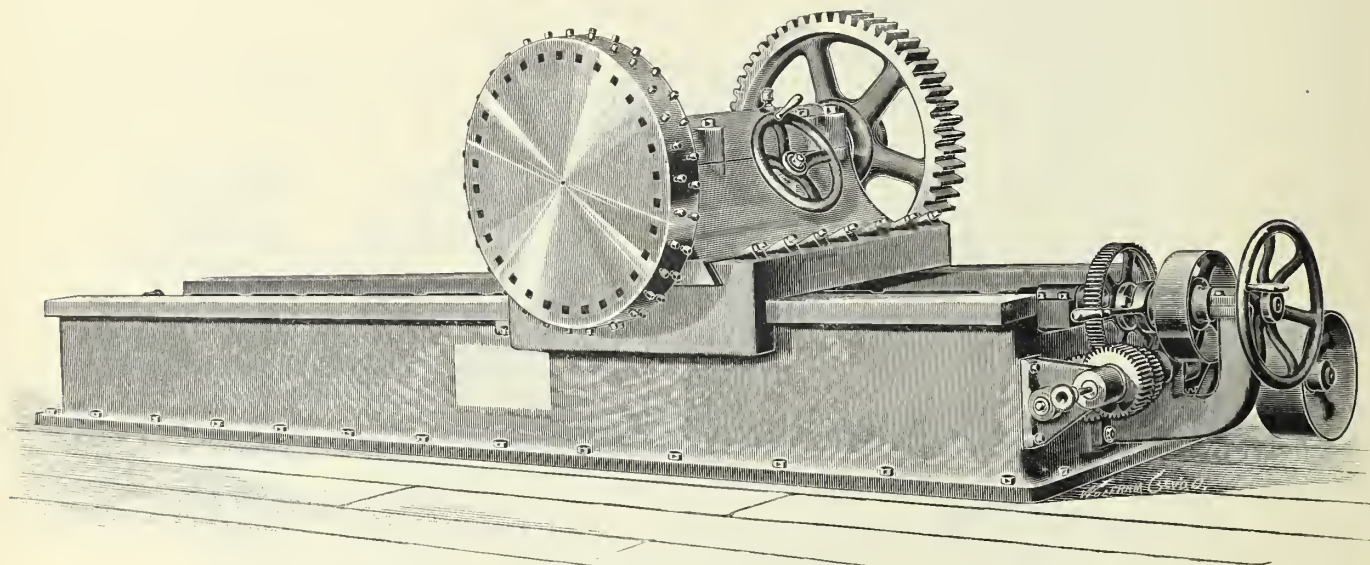
Tight and loose pulleys on countershaft, 24 inches diameter, 8 inch face.

Countershaft should make 280 revolutions per minute.

For general description, see page 164.

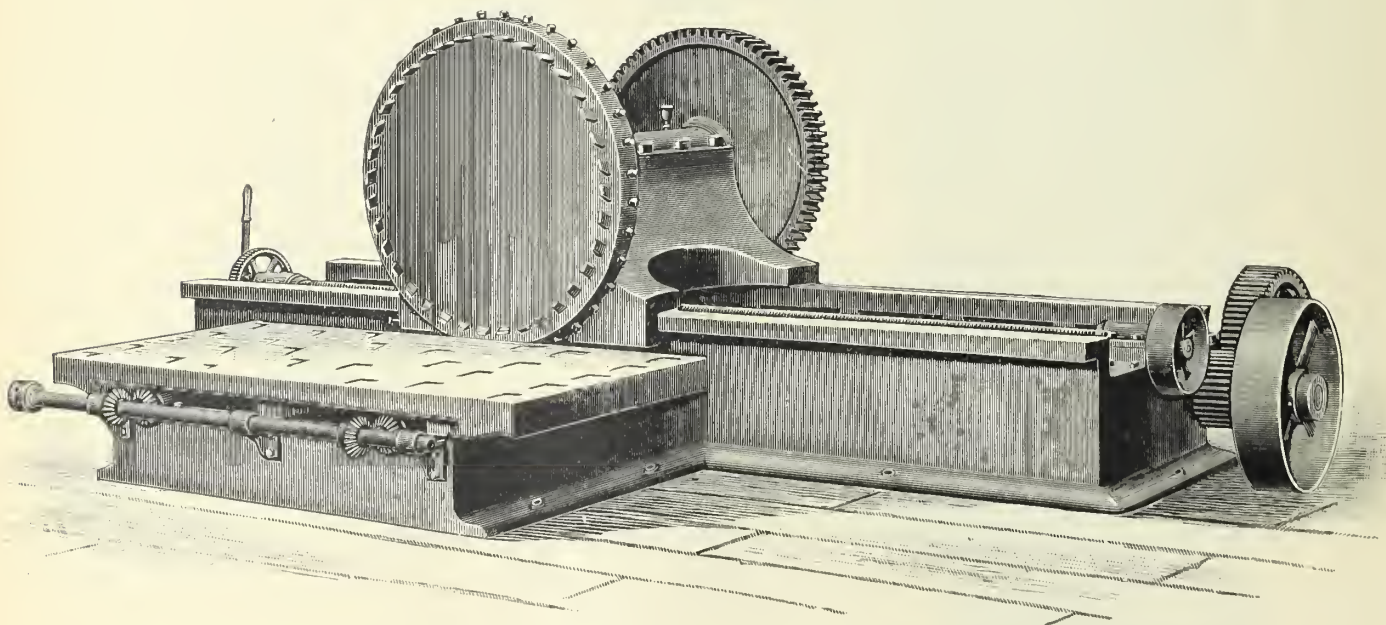
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FIG. 179.



NEW PATTERN ROTARY PLANER.

FIG. 180.



REGULAR PATTERN 36 INCH ROTARY PLANER.



NEW PATTERN ROTARY PLANER.

THE cut on opposite page illustrates our new pattern of Rotary Planer. This machine is designed for use where no table is required and a long feed is necessary.

It is powerfully geared and is designed for heavy work. There are two changes of automatic feed, and the cutting head has quick return. We furnish a gauge for the rapid and accurate setting of tools.

This cut represents a machine with 36 inch head. Length of bed, 16 feet; automatic feed, 12 feet 6 inches. Lateral adjustment of cutting head, $1\frac{1}{2}$ inches. We build this machine in four sizes, viz.: 30, 36, 42 and 48 inches, with either stationary base, as shown in cut, or with revolving base.

These tools are built in the best possible manner, with broad wearing surfaces, large bearings, etc., and ample provision for taking up wear.

REGULAR PATTERN ROTARY PLANERS.

THESE MACHINES have been carefully designed, and as carefully constructed. They are speeded to turn out in a given time the utmost possible amount of good work. Only the best material is used in their construction.

They have an automatic feed, which is positive and continuous, thereby securing an even and smooth cut. There are two speeds of feed which meet all requirements, and either can be started or stopped by handle shown at end of machine, there being no adjusting of any kind necessary, one disengaging completely before the other can be started. When facing cast iron columns there may be one or more in a lot, very hard, or even in a single one there may be a hard spot, and when this occurs, by using the slow speed the cutting tools do not deteriorate as rapidly. Again, in the facing of built up wrought iron or steel columns, etc., composed of light sections, the tendency is to spring and thereby break the edges of section or leave a rough surface, but by using fine feed this will be overcome. Where heavy sections are used the coarse feed can be used advantageously, at least to a point where the cutters begin to get through the work, and by changing the feed here, the edges will be left sharp and smooth. The head has quick return by separate countershaft.

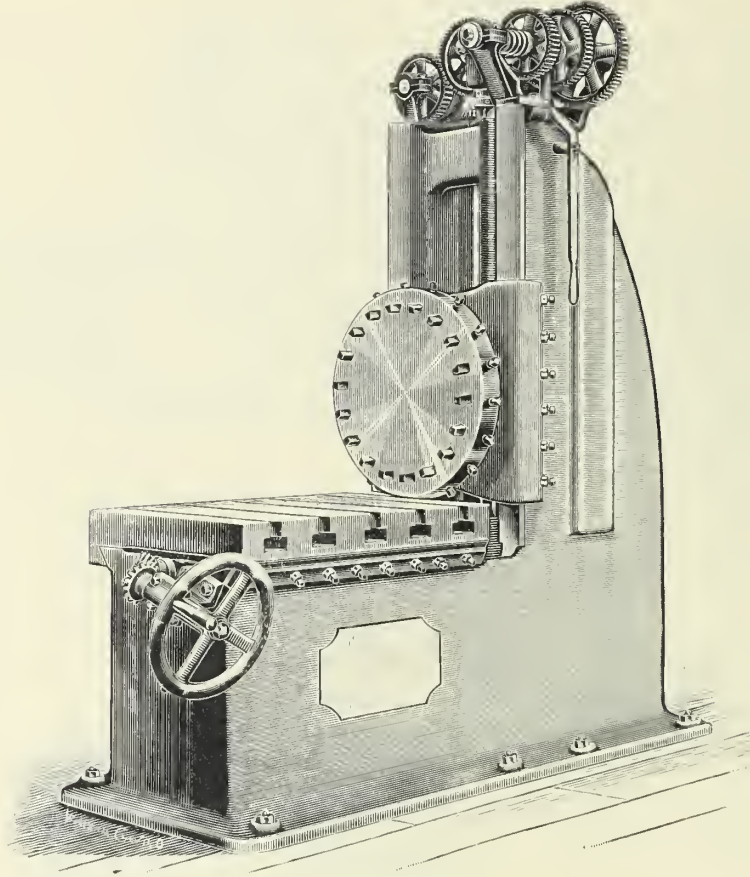
These machines are guaranteed to make true, smooth work.

SPECIFICATIONS.

	24 Inch.	30 Inch.	36 Inch.	42 Inch.
Length of bed, - - -	8 feet	8 feet	11 feet 6 inches	11 feet 6 inches
Diameter of cutter head, - -	24 inches	30 inches	36 inches	42 inches
Size of table, - - -	4 feet x 30 inches	4 feet x 30 inches	6 feet x 36 inches	6 feet x 36 inches
Size of tools, - - -	$1\frac{1}{4}$ x $\frac{3}{4}$ inches	$1\frac{1}{4}$ x $\frac{3}{4}$ inches	$1\frac{1}{4}$ x $\frac{3}{4}$ inches	$1\frac{1}{4}$ x $\frac{3}{4}$ inches
Number of tools, - - -	24	30	36	42
Diameter of spindle, - - -	$4\frac{1}{2}$ inches	5 inches	6 inches	7 inches
Diameter of steel worm, - -	$5\frac{1}{2}$ inches	6 inches	7 inches	$7\frac{1}{2}$ inches
Diameter of feed screw, - -	$2\frac{1}{4}$ inches	$2\frac{1}{2}$ inches	3 inches	3 inches
Diameter of worm shaft, - -	$2\frac{1}{4}$ inches	$2\frac{1}{2}$ inches	3 inches	3 inches
Diameter of worm wheel, - -	24 inches	36 inches	40 inches	48 inches
Face of worm wheel, - - -	3 inches	$3\frac{1}{2}$ inches	4 inches	$4\frac{1}{2}$ inches
Length of nut on feed screw, -	10 inches	12 inches	14 inches	15 inches
Feed per revolution, - - -	$\frac{1}{4}$ and $\frac{1}{2}$ inch	$\frac{5}{16}$ and $\frac{5}{8}$ inch	$\frac{3}{8}$ and $\frac{3}{4}$ inch	$\frac{7}{16}$ and $\frac{7}{8}$ inch
Revolution per minute, - - -	$3\frac{1}{2}$ inches	3 inches	$2\frac{1}{2}$ inches	$2\frac{1}{4}$ inches
Travel of head per minute, - -	$1\frac{3}{4}$ inches	$1\frac{7}{8}$ inches	$1\frac{7}{8}$ inches	$1\frac{5}{8}$ inches
Will face surface, - - -	24 x 48 inches	30 x 48 inches	36 x 72 inches	42 x 72 inches
Weight, - - - - -	pounds	pounds	pounds	pounds

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FIG. 181.



VERTICAL ROTARY PLANER.

THIS MACHINE is designed for use on work which cannot be done on our regular Rotary Planer, or where economy of room is desirable.

It is intended for any work where large surfaces are to be faced off, and will do true, smooth work.

It is provided with automatic variable feed and quick return to head.

Cut shows machine with plain table, with hand wheel for feeding work up to cutter head. A countershaft is furnished with each machine.

When the work is on small articles, we can furnish a rotary table with locking device, so that the operator can be setting one piece while another is being milled. This machine has cutter head 18 inches in diameter, and will surface work 18 inches broad and 18 inches high. Maximum feed is $1\frac{3}{4}$ inches per minute.

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FIG. 182.

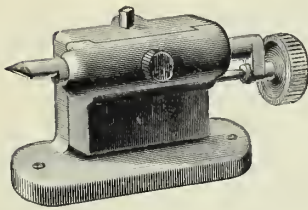
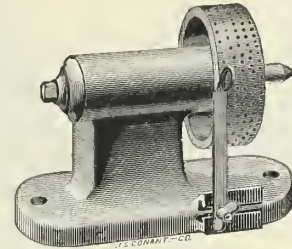


FIG. 183.



CENTERS FOR METAL PLANERS.

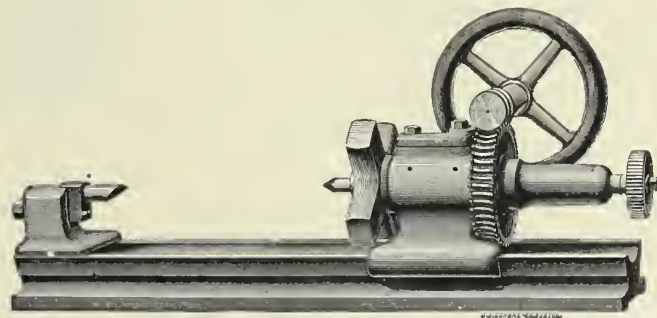
No. 1.

12 inch swing, perforated dial and spring stop.
12 inch swing, operated by hand-wheel, worm and worm gear, extra.

No. 2.

24 inch swing, perforated dial and spring stop.
24 inch swing, operated by hand-wheel, worm and worm gear, extra.

FIG. 184.



COMPOUND CENTERS.

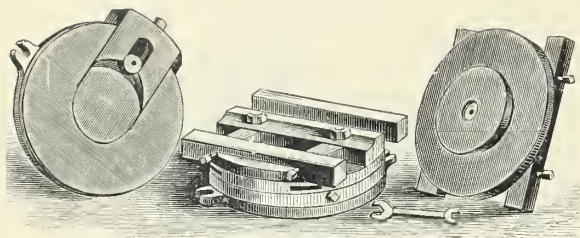
WILL TAKE IN 8 INCHES DIAMETER AND 20 INCHES LONG.

Has hand-wheel, worm and worm gear for rotating headspindle, spring stop for hand-wheel, dog face plate, steel spindle, with longitudinal screw adjustment of 4 inches; tool steel centers finished and hardened; headstock movable to position; tail-stock has elevating center. Weight, 112 pounds.

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PUTNAM PATENT CONE BASE PLANER CHUCK.

FIG. 185.

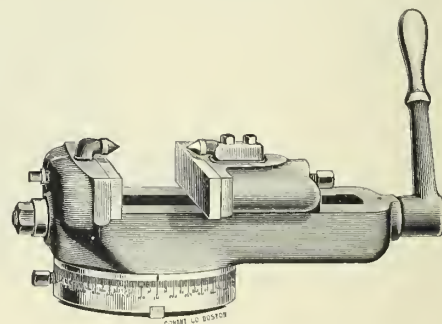


THIS cut represents the Putnam Patent Planer Chuck. The center view is the Chuck complete; the outside views are sectional representations showing its internal constructions. The adjustment of these Chucks to position requires the operation of only one screw. They are graduated, and are first-class in workmanship and materials throughout, and are the most convenient and efficient Chucks made. They are made in four sizes: 9 inch, 12 inch, 15 inch, and 18 inch.

10 INCH SLIDING JAW SWIVEL BASE CHUCK.

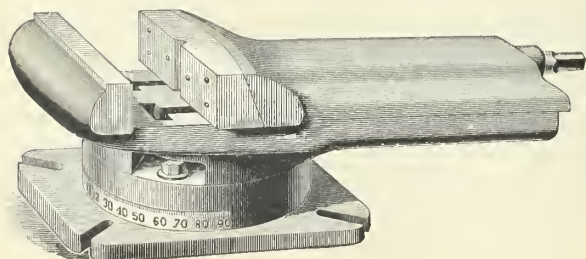
Length of jaws, 10 inches; jaws open, 8 inches. Has taper attachment which adjusts itself automatically to straight, round, taper, bevel, or any irregular work. A single screw operates the jaws and clamps the work. The screw and all the wearing parts are protected from chips and dirt. The movable jaw is held firmly to base, and is arranged so that wear may be taken up. The swivel base is accurately graduated, and the jaws are faced with steel. Jaws are provided with centers. Weight, 105 pounds.

FIG. 186.



18 INCH SLIDING JAW SWIVEL BASE CHUCK.

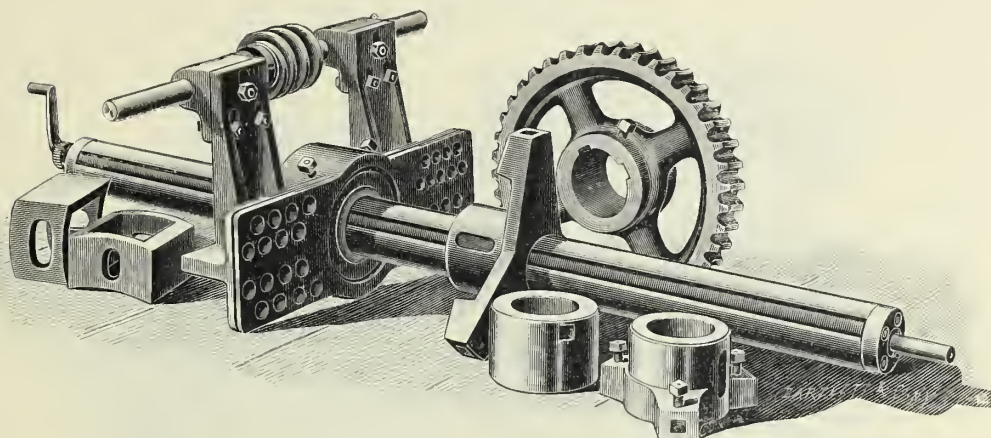
FIG. 187.



Length of jaws, 18 inches; jaws open, 10 inches. Has taper attachment which adjusts itself automatically to straight, round, taper, bevel, or any irregular work. A single screw operates the jaws and clamps the work. The screw and all the wearing parts are protected from chips and dirt. The movable jaw is held firmly to base, and is arranged so that wear may be taken up by gibs. The swivel base is accurately graduated, and the jaws are faced with steel. Weight, 335 pounds.

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FIG. 188.



PORTABLE CYLINDER BORING MACHINE.

THESE MACHINES are designed for re boring steam cylinders of every description, without removing same from bed-plate. Locomotive cylinders, pumps, valve chambers, stern tubes, taper holes, fly wheels or housings, dynamos, cotton compressors, hydraulic presses, etc., can be easily and quickly bored.

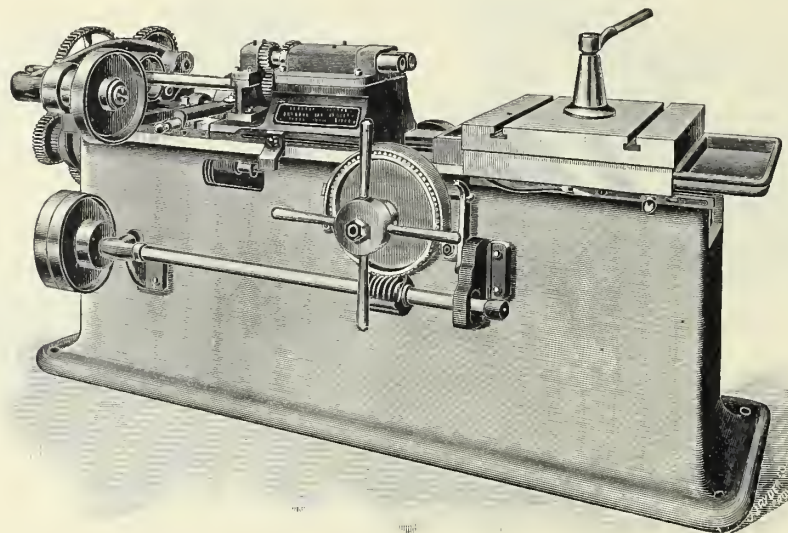
The simplicity of this bar enables a man of slight experience as machinist to successfully operate it without a possible chance of breaking the machine or spoiling the work he undertakes. Each bar is supplied with a continuous gear-feed, belt-wheel and hand-wheel for driving bar; also two cutter-heads or more when ordered, and four blocks for attaching bar to work to be bored. Workmanship and material used are strictly first-class.

SPECIFICATIONS.

DIAMETER OF BAR.	BORES CYLINDERS.	LENGTH OF TRAVEL.
2¼ inches	3½ to 10 inches diameter	30 inches
3½ inches	6 to 24 inches diameter	32 inches
4½ inches	8 to 36 inches diameter	50 inches
6 inches	14 to 48 inches diameter	62 inches
7½ inches	20 to 100 inches diameter	98 inches
10 inches	24 to 110 inches diameter	120 inches

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FIG. 189.



TWO SPINDLE BORING MACHINE WITH REVOLVING TABLE.

THIS MACHINE is suitable for short boring, turning, threading or tapping. Work is fastened on front and back of revolving table which has a binder as shown in the center. Locking or indexing pin is operated by a sliding catch shown on front of machine. Table is then revolved half around and work of spindles started. While the operation of cutting is going on, work can be removed and replaced on opposite side where pan is shown.

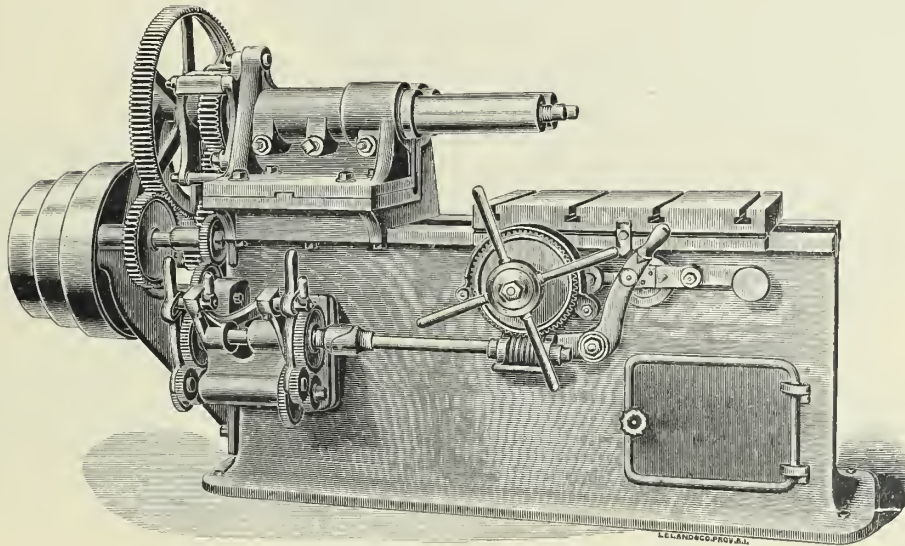
The revolving table saddle is stationary, and spindle head moves against the work by automatic feed through rack and pinion. A lead screw is located under head and can be attached to feed head by an open and shut nut which insures accuracy of taps or dies. Change gears are provided that any pitch desired can be obtained.

SPECIFICATIONS.

Total length of machine, 7 feet. Height of center of spindles, 36 inches from floor. Revolving table, 20 x 20 inches. Center of spindle to revolving table, 4 inches. Detachable heads with spindles, $2\frac{1}{4}$, 3 and $3\frac{3}{8}$ inches, center to center of spindles. End of spindles to edge of revolving table, greatest, 14 inches; least, 1 inch. Changes made to conform to any requirements. Weight about 4200 pounds.

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FIG. 190.



ADJUSTABLE TWO SPINDLE BORING MACHINE.

PLAIN TABLE.

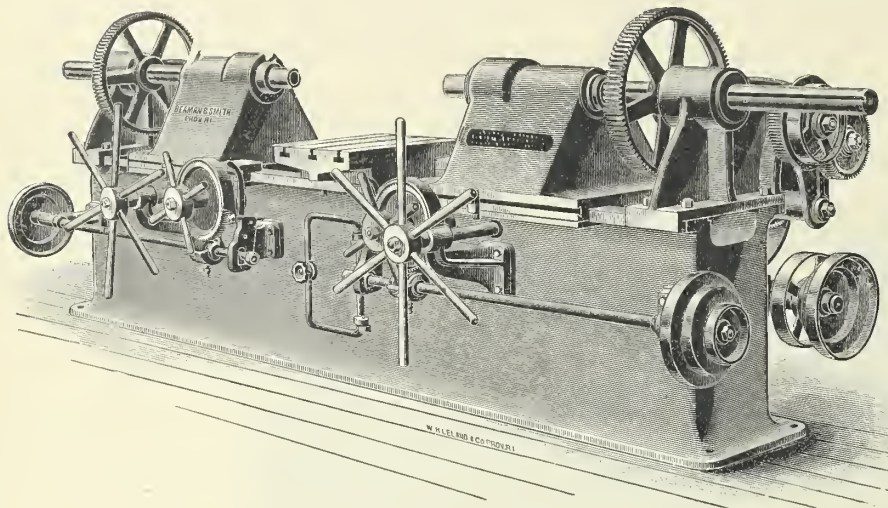
THIS MACHINE, as shown, has a plain table moved by hand or power, with automatic stop, with power feed at four ratios. The head is stationary, and spindles are adjustable from center to center and is strongly geared. Spindles are large with overhang for deep boring with short tool heads.

SPECIFICATIONS.

Whole length of machine, $7\frac{1}{2}$ feet. Center of spindle from floor, 38 inches. Center of spindle from platen, $8\frac{1}{2}$ inches. Extreme overhang of spindle, $16\frac{1}{2}$ inches. Diameter of spindles, 4 inches. Cone has three sections for $3\frac{1}{2}$ inch belt. Ratio of gearing to spindle, 27 to 1. Least distance of spindle centers, 6 inches. Automatic feed, 20 inches. Platen, 28 inches long, 20 inches wide. Changes will be made as may be required. Weight about 5000 pounds.

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FIG. 191.



SPECIAL DOUBLE HEAD BORING MACHINE.

THIS MACHINE consists of a bed 11 feet long, with stationary platen and two heads. Each head is driven by its own feed mechanism independently. Spindles are large, and each provided with a recess threaded end for holding tools, etc.

SPECIFICATIONS.

Extreme length, with spindles clear back, 15 feet. Center of spindles from floor, 44 inches. Center of spindles from platen, $8\frac{1}{2}$ inches. Diameter of spindle at large end, $4\frac{7}{8}$ inches. Least dist-

ance between spindles, $6\frac{1}{4}$ inches. Greatest distance between spindles, 54 inches. Ratio of gearing, 15 to 1 and 30 to 1. Driving cone has three sections for $3\frac{1}{2}$ inch belt. Two countershafts, each provided with two sets of tight and loose pulleys, 200 and 400 revolutions per minute. Weight, about 10500 pounds.

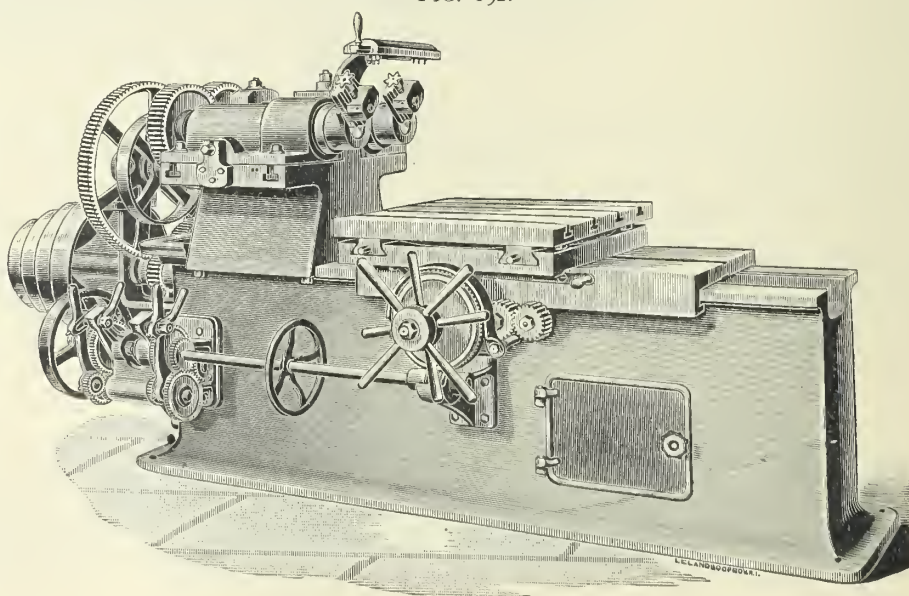
FIG. 192.

DUPLEX PUMP BORING MACHINE.

THIS MACHINE, as illustrated carries a head which has two spindles which can be adjusted from center to center, as required, for the spread of duplex pumps, and can be fitted with two sets of spindles ranging from 4 to 12 inches, center to center.

Platen is moved by a screw, either by hand or power, and has a revolving table which can be securely clamped after indexing.

The machine is strongly geared and has four feeds; also a fine adjustment by hand for setting tools.

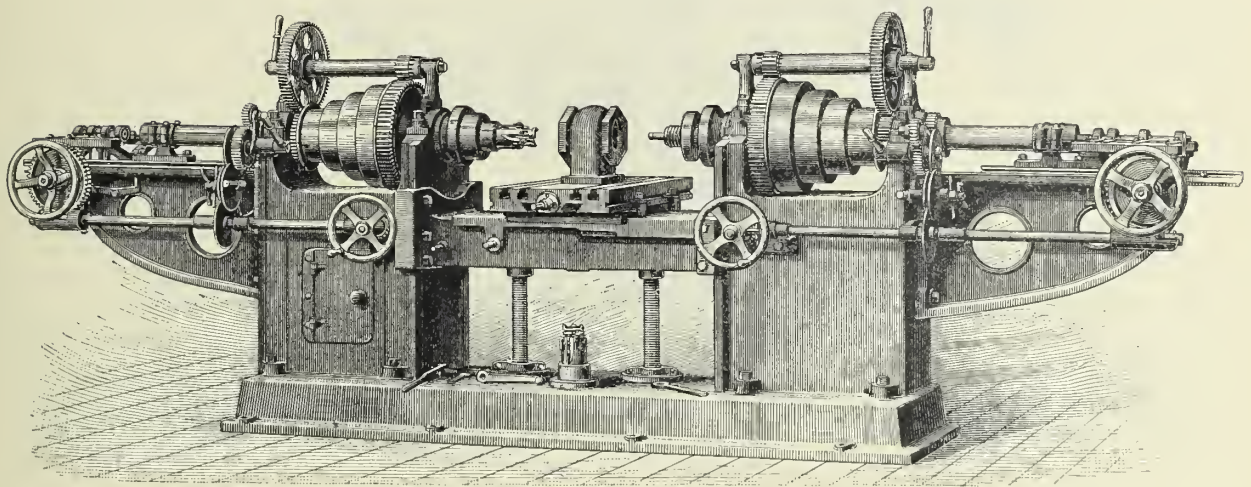


SPECIFICATIONS.

Length of machine, 11 feet. Height of centers from floor, 47 inches. Height of centers above revolving table, 28 x 28 inches. Length of platen, 18 inches. Ratio of gearing, average, 27 to 1. Weight, about 8000 pounds.

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FIG. 193.



DOUBLE HEAD HORIZONTAL BORING MACHINE,
WITH INTERMEDIATE TABLE.

THIS MACHINE will be found to be admirably adapted for any class of work which is to be operated upon from opposite sides at the same time. In the present case, the tool was adapted to boring, facing and tapping double gate valves.

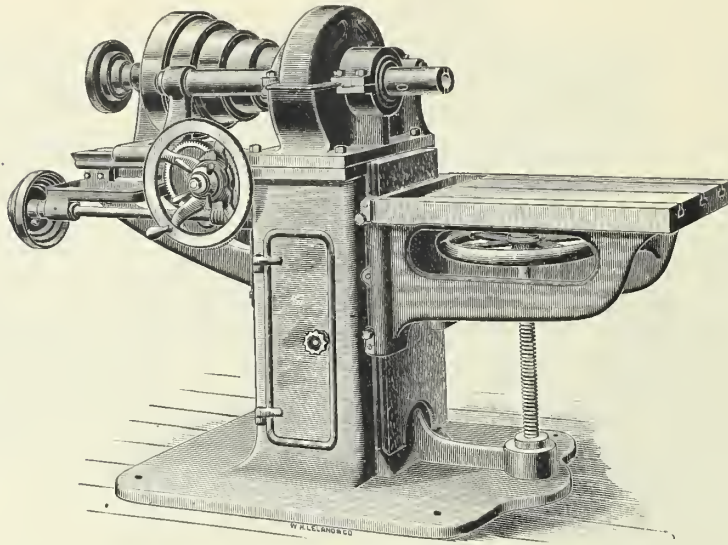
It consists of two heads bolted to a heavy bed plate, with a table, adjustable vertically, placed between them. The work is to be bolted to a compound carriage, having horizontal movements lengthwise and crosswise of the table. It is clear that the work can be set with the greatest rapidity by these respective movements, using no blocking whatever. The bars have slow and rapid hand motions, as well as power feeds, both forward and backward. The diameter of the bars in this case is 4 inches; but heads with heavier bars can be furnished. The bars are shown, provided with threads and flanges for the expansion cutter heads; but the bars may be finished in any manner to suit desired tools.

In the illustration the machine is fitted to bore face and tap valves using expansion cutter heads, the frame only of the motion for operating the cutters is shown, as the rods and the other details would have confused the illustration. The machine will be furnished with any desired style of head or with none as the customer may desire.

Two countershafts go with this machine.

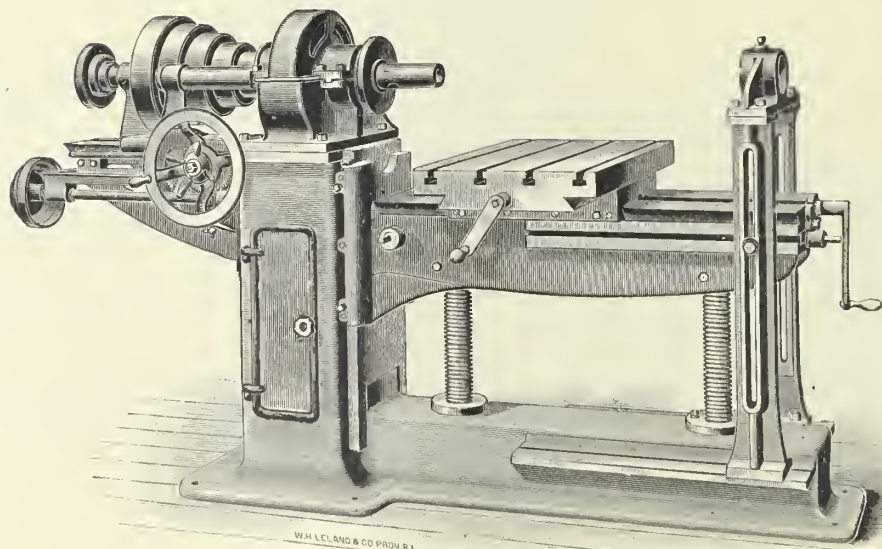
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FIG. 194.



No. 1 STANDARD DRILLING AND BORING MACHINE.

FIG. 195.



No. 2 STANDARD DRILLING AND BORING MACHINE.



No. 1 STANDARD DRILLING AND BORING MACHINE.

THIS MACHINE is intended for drilling, boring and tapping a great variety of work for which a much more expensive tool would ordinarily be required. When desired it can be furnished with an outer bearing for boring bars, also with a cross table provided with longitudinal traverse.

The standard has shelves cast in, making a convenient receptacle for tools, etc. It is provided with a large flange on the bottom, which is 3 x 4 feet, thus insuring a firm floor bearing.

The knee or platen is 20 inches wide, 32 inches long, has three **T** slots, is well braced, also supported by elevating screw 1½ inches diameter, which is placed well out from standard, with 18 inch hand wheel for adjustment. The bearing on standard is 16 inches, is gibbed and provided with binders for rigid fastening. The least distance from top of table to center of spindle is 2 inches; the greatest, 24 inches.

The spindle is 3 inches in diameter, has No. 5 Morse taper hole for tools, also driving slot across the end. It has 20 inch movement by hand or power and is driven by a 3 inch belt on a 5 section cone, 6 to 16 inches in diameter, is geared direct 3 to 1, and back geared 24 to 1, which gives 10 speeds from 2½ to 160 revolutions per minute. The gearing is protected by shields. The spindle quill has long conical ends running in taper boxes of hard bronze, with take-up for wear.

The automatic feeds are 120, 80, 40 and 13½ revolutions of spindle to 1 inch of feed.

The countershaft has two sets of tight and loose pulleys, 14 inches diameter for 3¼ inch belt, and should run 190 revolutions per minute.

No. 2 STANDARD DRILLING AND BORING MACHINE.

THIS MACHINE is intended for drilling, boring, facing and tapping, has large cone pulley, heavy gears, is powerfully belted, and has long spindle traverse.

It will bore to the center of a 48 inch circle, has cross table 20 x 40 inches, with 24 inch cross movement. Saddle has 24 inch movement parallel with spindle. Spindle has 20 inch traverse by hand or power.

The standard base has shelves cast in, making a convenient receptacle for tools, etc.

The spindle is 3 inches diameter, has No. 5 Morse taper hole for tools, and is driven by a 3 inch belt on a 5 section cone pulley, 6 to 16 inches in diameter, is geared direct 3 to 1, and back geared 24 to 1, which gives 10 speeds 2½ to 160 revolutions per minute. Gearing is protected by shields. The spindle quill has long conical ends, running in taper boxes of hard bronze, with take up for wear. Has face plate to attach facing head, etc.

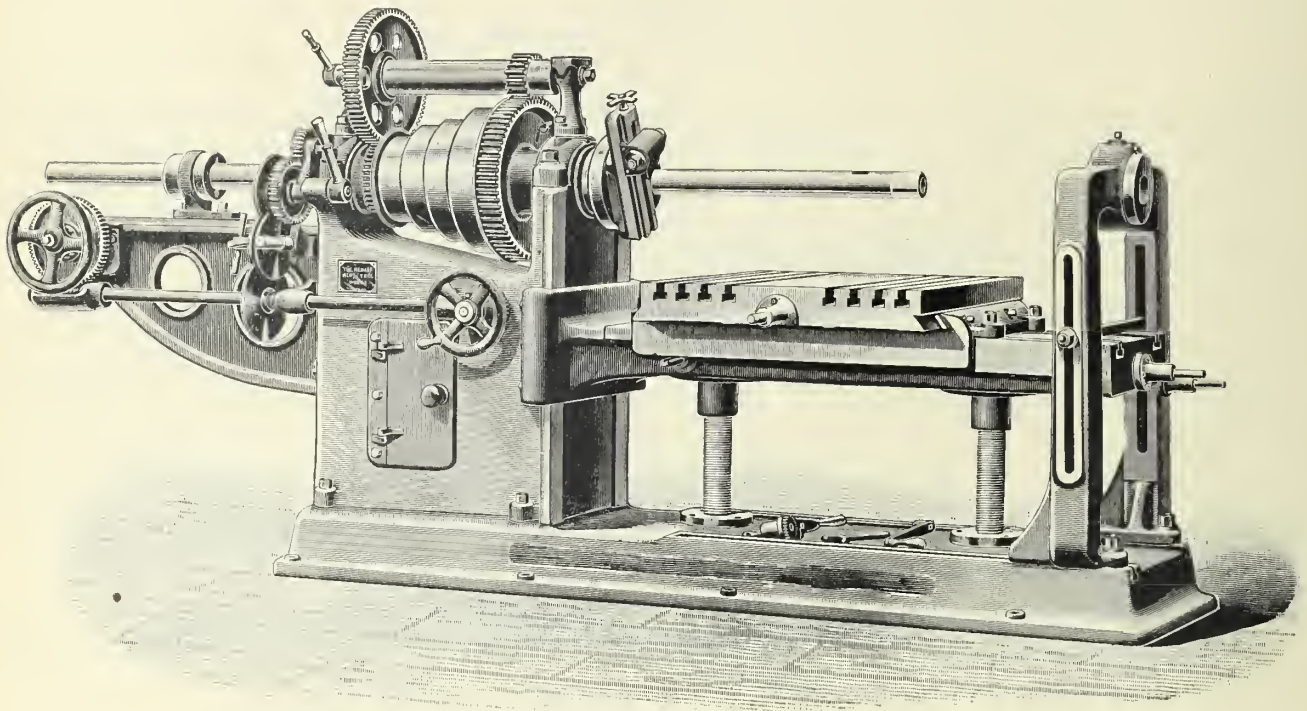
The outer bar support can be removed, and side support for knee can be retained if so desired; elevating screws are 3½ inches in diameter, operated from end or side of knee. The nuts for elevating screws have compensating adjustment, enabling knee to be kept parallel with spindle.

The feeds are 13½, 40, 80 and 120 revolutions of spindle to 1 inch traverse of spindle.

The countershaft has two sets of tight and loose pulleys, 14 inches in diameter for 3¼ inch belt, and should run 190 revolutions per minute either way. Weight, 6500 pounds.

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FIG. 196.



STYLES C. & D. HORIZONTAL BORING AND DRILLING MACHINES.

THESE are the standard machines for rapid and accurate boring. Their superiority is due to the ease with which the work can be accurately set, to the quick handling of the boring bar, and to the concentration of the power upon the cutting tool. In addition to its efficiency as a boring machine there is no better tool for heavy, flat and face milling, key-set milling and accurate drilling. These machines are built by us in four sizes, of which the driving power and weight are in proportion to the diameter of the boring bar. The boring bars are respectively, 3 ins., 4 ins., 5 ins., and 9 ins. in diameter for the "C," "D," "E" and "F" machines. The cut shows the smallest size, the "C" or 3 in. bar machine. We furnish carriage, table and swing to suit the needs of the customer when necessary.

The work is bolted to the carriage directly under the boring bar, the work being set square by the top surface and the edges of the carriage, which are absolutely true with regard to the bar. The carriage can be moved either across or along the table, which is supported by two large screws. The table can be lowered or raised from the side or at the end. With these movements of the table and carriage, using no blocking whatever, the work can be set quickly and with perfect accuracy, for all the surfaces and motions are absolutely true with regard to the bar.

A yoke of great strength braces the table, and is provided with double bushings to steady, without wear, the end of the boring bar or the arbor. The boring bar is fed by a rack and pinion, and it is held by a friction clamp, so that, by easing the clamp and taking another grip, a very long feed can be obtained. The feed motion is positive and very powerful. The bar can be fed by hand also, with either a quick or slow motion.

The distinguishing advantages of our machine are as follows: Self-acting reversible feeds, without reversing the direction of the motion of the cone or stopping the machine. Wide range of feeds, from 1-80 to $\frac{1}{4}$ of an inch, which can be changed without stopping the machine. Friction feed clamp, with lost motion take up, grasping the bar at any point. Double bushing in the yoke. Improved facing attachment.

SPECIFICATIONS.

STYLE "C."

Diameter of bar, - - - - -	(2 $\frac{3}{8}$) 3 inches
Length of table, - - - - -	5 feet
Swing over carriage, - - - - -	4 feet 3 inches
Swing over table, - - - - -	4 feet
Diameter of large speed of cone, - - - - -	16 inches
Width of step, - - - - -	3 $\frac{1}{2}$ inches
Carriage, - - - - -	30 inches long, 30 inches wide
Cross feed, - - - - -	2 feet
Length of machine over all, - - - - -	10 feet 9 inches
Weight, - - - - -	7500 pounds

This machine will bore holes as large as 18 inches internal diameter.

STYLE "D."

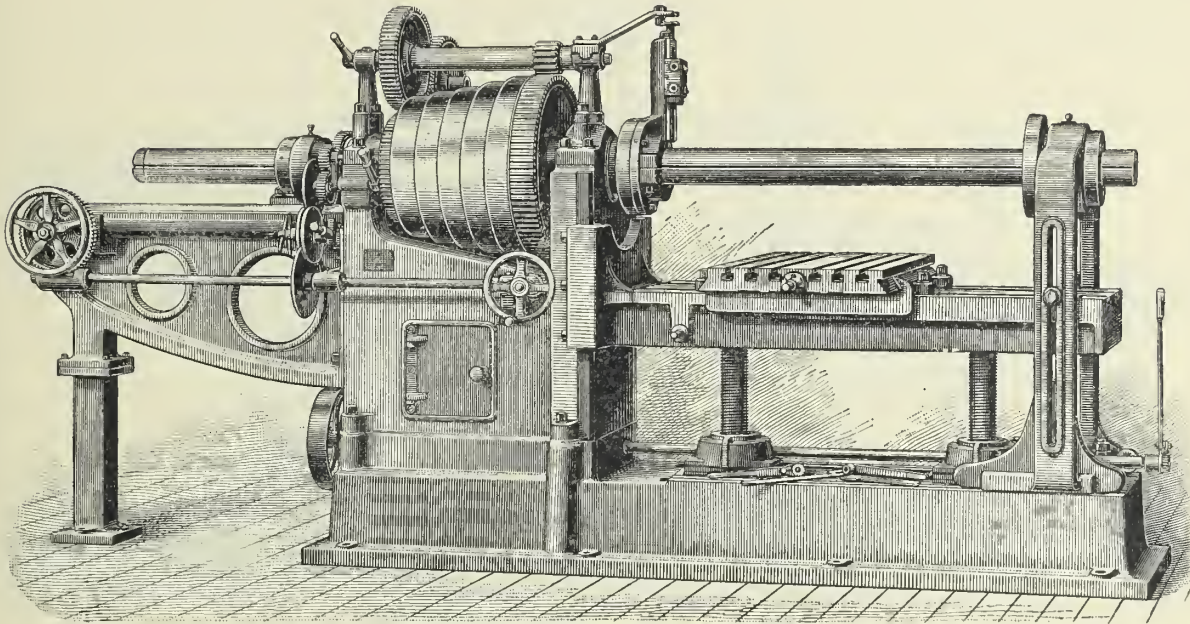
Diameter of bar, - - - - -	4 inches
Length of table, - - - - -	6 feet
Swing over carriage, - - - - -	4 feet 2 inches
Swing over table, - - - - -	5 feet
Diameter of large speed of cone, - - - - -	18 inches
Width of step, - - - - -	4 inches
Number of steps, - - - - -	4
Carriage, - - - - -	36 inches long, 30 inches wide
Cross feed, - - - - -	28 inches
Length of machine over all, - - - - -	12 feet 2 inches
Weight, about - - - - -	10000 pounds

This machine will bore holes as large as 24 inches internal diameter.

A longer main table and greater swing can be furnished. The sizes of the carriage may be changed to suit especial work. Facing attachment furnished with the machine.

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FIG. 197.



STYLE E HORIZONTAL BORING AND DRILLING MACHINE.

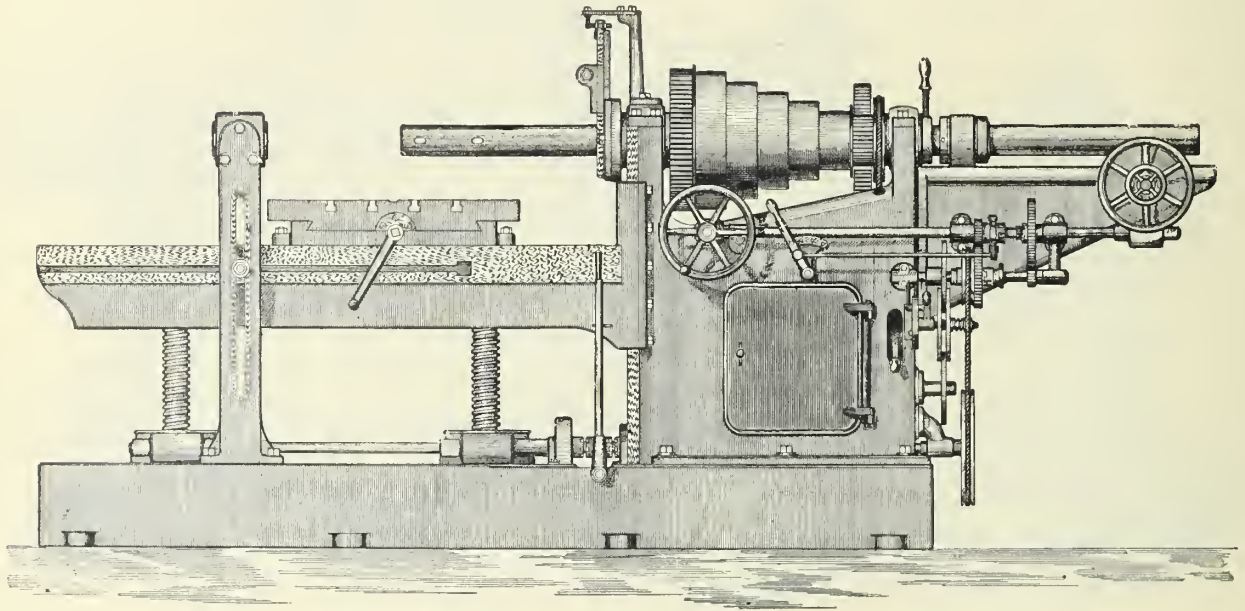
THE cut on this page shows one of the larger sizes of Horizontal Boring Machines. We call this the E or 5-inch bar machine. It has been the custom, heretofore, to grade the class of machine tools by the swing; but we claim that the diameter of the boring bar is the only correct measure of the size of the tool, for this limits its greatest cylinder boring capacity.

The cut shows a table 9 feet in length, but shorter tables are furnished, and the swing, also, may be increased if desired. This machine has the same features and style shown in the design of the smaller tool. The feed can be varied from $\frac{1}{80}$ to $\frac{1}{4}$ inch without stopping the machine; the bar can be gripped at any point, and it can be fed backward or forward without resetting the cutters. There is also a quick and slow hand motion for the bar. The power lift for the table is a feature peculiar to the larger machines. It will be noticed that the lower ends of the table lifting screws are carried by worm gears threaded to serve as nuts. These gears take their motion from the worm shaft, which is driven from the feed shaft by means of the chain gearing. In this way the power from the driving cone is used to lift the table, and this arrangement enables the workman to move the table without leaving his position, and when the work is nearly set he can throw the power lift out of gear and make the delicate final adjustment by hand, using the slow feed hand wheel.

Other excellent points are the strong forms of table and yoke. The table is not cut in two to receive the feed screw for the saddle, and this construction permits a system of cross bracing underneath. These features add materially to the stiffness of the machine.

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FIG. 199.



60 INCH HORIZONTAL BORING AND MILLING MACHINE.

The cone has 5 steps for 4 inch belt ; range, 9 inches to 22 inches in diameter. The back gear ratio is 10:1.

The spindle is 5 inches in diameter, of high carbon hammered steel. The socket is $3\frac{1}{4}$ inches in diameter and tapered 1-16 inch to the inch.

The spindle has traverse of 60 inches at two strokes, and is guided through a sleeve 46 inches long. Usual quick return is provided.

Main table 8 feet long, 26 inches wide ; cross table, 3 feet wide by 4 feet long.

Over main table, 60 inches ; over cross table, 46 inches.

The spindle feed is from 1-200 inches to 6-10 inches per revolution of spindle. This range has never before been approached in this type of machine.

The main table has vertically all feeds common with spindle. The cross table has hand and automatic feeds in both directions.

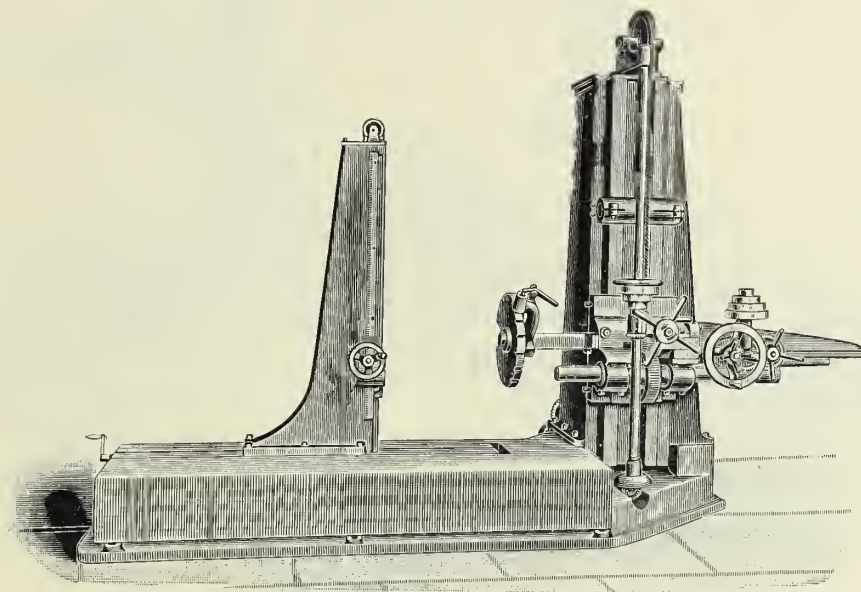
All adjustment can be made by the operator from one position.

This machine is especially adapted to end milling, slabbing and rack cutting within its range.

Elevating screws, $4\frac{1}{2}$ inches in diameter. The boring bar can be removed from this machine without having to slide through the outer bearing in yoke.

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FIG. 200.



HORIZONTAL SPINDLE DRILLING AND BORING MACHINE.

THIS MACHINE consists of a platen or bed with stationary upright, carrying spindle head with feed mechanism, which is counterbalanced by a weight in the upright, and the up and down movement is by means of rack and pinion operated by pilot wheel shown on front of head.

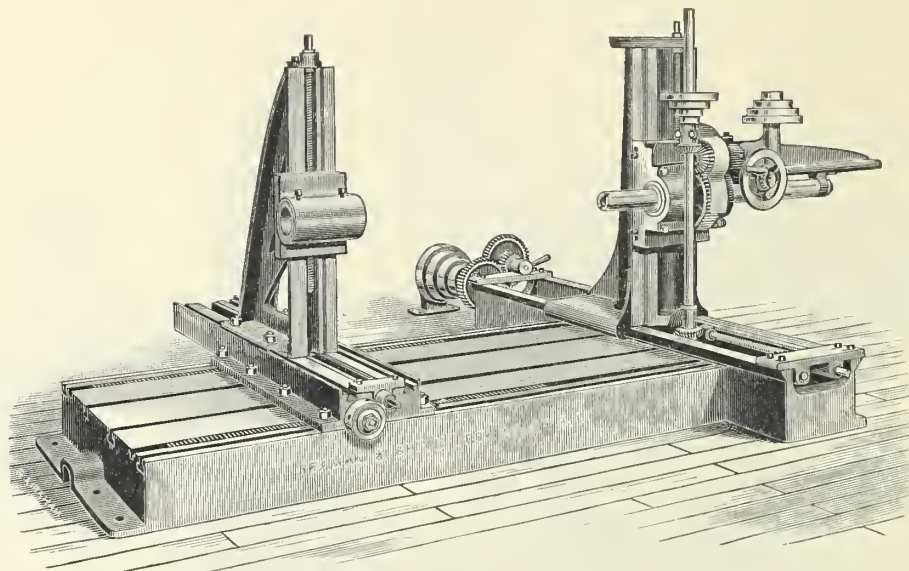
The left hand upright is moved back and forth on platen in line of spindle by means of a screw. The outer support head which forms a rest for boring bars is moved up and down on upright by rack and pinion, and is counterbalanced by weight in the upright. The circular disc shown above spindle forms a drill guide which can be fitted with bushings, as desired, or removed entirely.

SPECIFICATIONS.

Platen is 12 feet long, 30 inches wide, and 15 inches high. Stationary upright is $8\frac{1}{2}$ feet high from floor, 20 inches width of face. Left hand upright can be adjusted to within 18 inches of spindle head, or moved back to 72 inches. Spindle is $3\frac{1}{2}$ inches diameter, and has No. 5 Morse taper hole in end for tools, etc. Spindle can be lowered to within $2\frac{1}{2}$ inches from center to top of platen, or raised to 60 inches above. Ratio of spindle gearing, 3 to 1; also 10 to 1. Any required speed from 9 to 222 turns is available. Feeds are 13, 40, 80 and 120 revolutions of spindle to 1 inch travel. Weight, about 15500 pounds.

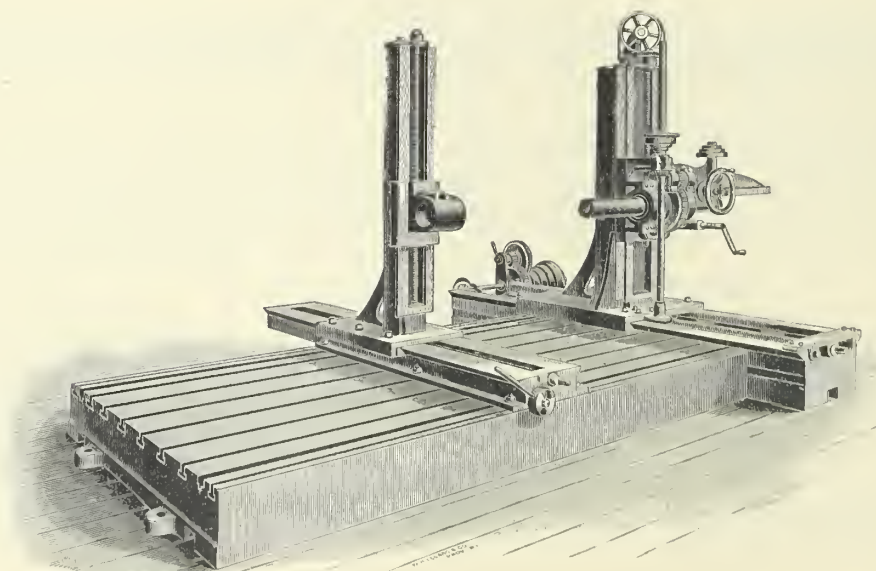
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FIG. 201



No. 1 HORIZONTAL SPINDLE DRILLING AND BORING MACHINE.

FIG. 202.



No. 2 HORIZONTAL SPINDLE DRILLING AND BORING MACHINE.



No. 1 HORIZONTAL SPINDLE DRILLING AND BORING MACHINE.

THIS MACHINE is intended for drilling or boring work which can be securely fastened to the bed and tools brought to the desired position without the necessity of moving work, which is much more convenient and accurate than moving work, particularly when it is heavy.

The platen is 8 inches high, 40 inches wide, 84 inches long, is heavy and well ribbed, has 7 T slots $\frac{7}{8}$ inch wide, and to it is securely fastened the bed which supports the upright with spindle.

Spindle is 3 inches diameter, has No. 5 Morse taper hole for tools, also driving slot across the end, has 24 inch movement by hand or power, is driven by a $2\frac{1}{2}$ inch belt on a five section cone geared 3 to 1, and back geared 24 to 1, which gives 10 speeds from 3 to 150 revolutions per minute. The spindle quill has large conical ends running in taper boxes of hard bronze, with take-up for wear.

Automatic feeds are 120, 80, 40, and $13\frac{1}{3}$ revolutions of spindle to 1 inch of feed.

The greatest distance from top of platen to center of spindle is 40 inches, the least, 10 inches. The spindle can be moved vertically 30 inches, horizontally 40 inches, and the outer bearing moved to correspond. Accuracy of adjustment is secured by four graduated steel rules suitably placed with pointer.

Carriage on platen has a quick adjustment by racks and pinions from outer end of platen nearly to spindle, and can be rigidly fastened. The greatest distance from spindle head to outer bearing is 70 inches.

Countershaft has tight and loose pulleys, 14 inches diameter for $2\frac{1}{2}$ inch belt, and should run 130 revolutions per minute, both directions.

Weight, 6500 pounds.

No. 2 HORIZONTAL SPINDLE DRILLING AND BORING MACHINE.

THIS MACHINE is intended for drilling or boring work resting on platen, and tools can be brought to any desired position within the range of spindle without the necessity of moving work.

The platen is 12 inches high, 72 inches wide, 11 $\frac{1}{2}$ feet long, is very heavy and well ribbed, has 8 T slots, $\frac{7}{8}$ inch wide, and to it is securely fastened the bed which supports the upright with spindle.

Spindle is 5 inches diameter, has No. 6 Morse taper hole for tools, also driving slot across the end, has 31 inch travel by hand or power, is driven by a 3 inch belt on a 5 section cone pulley geared 4 to 1, and back geared 36 to 1, which gives 10 speeds from $1\frac{1}{2}$ to 105 revolutions per minute. The spindle quill has large conical ends, running in taper boxes of hard bronze, with take-up for wear.

Automatic feeds are 120, 80, 40 and $13\frac{1}{3}$ revolutions of spindle to 1 inch travel.

The greatest distance from top of platen to center of spindle is 61 inches, the least $15\frac{1}{2}$ inches. The spindle can be moved vertically 46 inches, horizontally 72 inches, and the bar support to correspond. Greatest distance suitably between spindle and bar support 10 feet, least distance 3 feet. Accuracy of adjustment is secured by 4 graduated steel rules, placed, with pointers.

Carriage on platen has a quick adjustment by racks and pinions, and can be rigidly fastened.

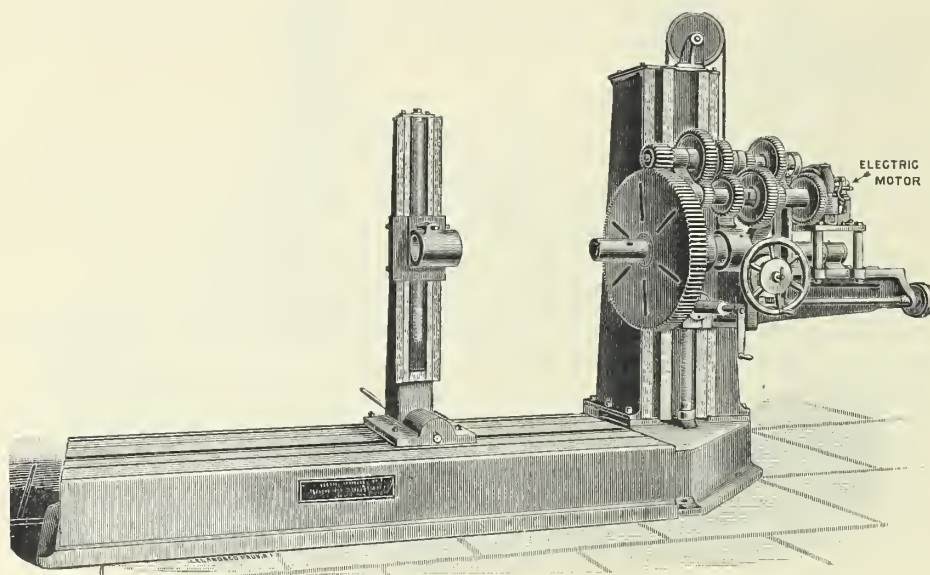
Changes made to suit any requirements.

Countershaft has tight and loose pulleys, 12 inches diameter for 4 inch belt, and should run 170 revolutions per minute either way.

Weight, 25000 pounds.

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FIG. 203.



HORIZONTAL SPINDLE DRILLING AND BORING MACHINE.

ELECTRIC MOTOR DRIVEN.

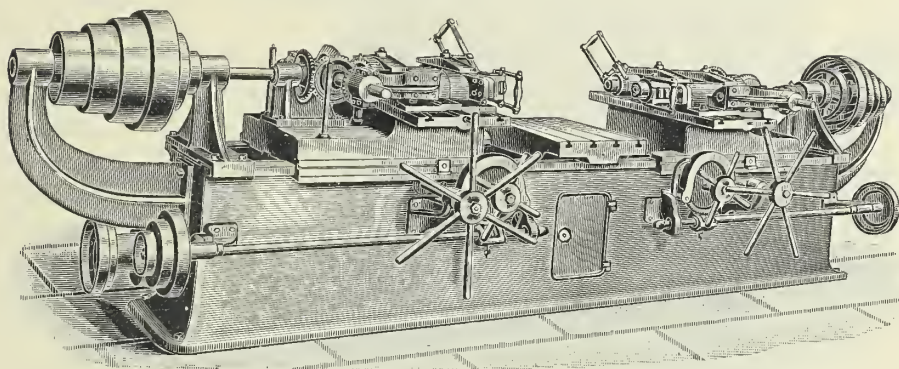
THIS MACHINE consists of platen, with stationary upright carrying spindle head with its feed mechanism, and 1 horse power electric motor. The left-hand upright has a movement in line of spindle on top of platen by racks and pinions; also a support head for boring bars, which has a movement by screw to correspond with spindle head movement.

SPECIFICATIONS.

Platen is 13 feet long, 40 inches wide, and 15 inches high. Upright is 8½ feet in height above floor, 20 inches width of face. Greatest distance between uprights, 9 feet 3 inches. Least distance between uprights, 2 feet. Spindle head bearing on upright, 40 x 20 inches. Spindle, 5 inch diameter; No. 6 Morse taper hole in end. Greatest distance from center of spindle to platen, 62 inches. Least distance from center of spindle to platen, 21 inches. Spindle gear, 36 inches diameter, 4 inch face, 3 pitch. Ratio of gearing, 20, 60, 136 or 408 revolutions of motor to one of spindle. Spindle has 12 speeds suitable for work from ¼ to 40 inches diameter. Feed is 31 inches; rate, 13, 40, 80 and 120 revolutions of spindle to 1 inch travel. Weight, about 20000 pounds.

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FIG. 204.



ADJUSTABLE FOUR SPINDLE DRILLING AND BORING MACHINE.

THIS MACHINE has a stationary platen in center of bed with two movable heads, each carrying two spindles, adjustable between centers, to conform to work under operation.

Each set of spindles is driven independently, also feeds for heads, which are provided with automatic stop. Spindles are made with Morse standard taper hole, and provided with mechanism for removing tools without stopping spindles from revolving.

SPECIFICATIONS.

Extreme length of machine, 16 feet 4 inches. Bed is 23 inches wide on top. Platen is 20 inches in line of spindles. Platen is 28 inches across bed. Spindle centers are 40 inches above floor. Spindles can be brought nearly together and separated to 48 inches, end to end. Spindle centers are adjustable from 5 inches to 18 inches. Spindle centers above platen, 8½ inches. Ratio of gearing, 2 to 1. Cone sections are 11, 13½, 16 and 18½ inches diameter for 3½ inch belt. Feeds for drilling, 26, 51, and 102 revolutions of spindle to 1 inch feed. Feeds for boring, 8, 16 and 32. Spindle revolutions, 40, 55, 75, and 109 per minute. Changes made to meet requirements. Weight, about 11000 pounds.

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FIG. 205.

IMPROVED BORING AND DRILLING MACHINE.

THE illustration shows our new Boring and Drilling Machine which has been specially designed for boring heavy forgings and cutting out holes from solid steel plates. The construction of the tool is a very heavy one, and all parts are so proportioned that perfect satisfaction is secured in doing the heaviest work.

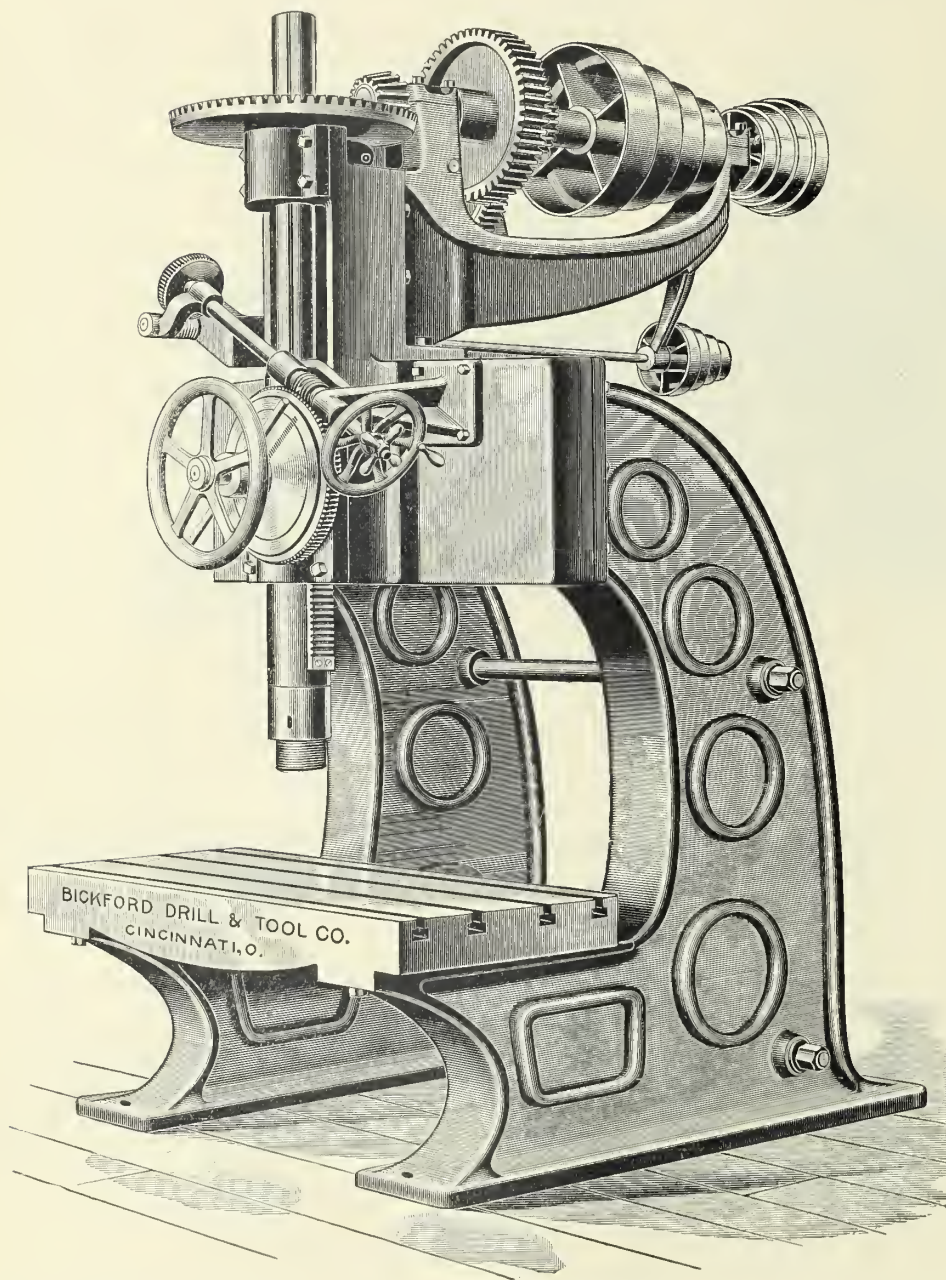
The spindle is of forged steel, and has a taper hole in the end for large drills, likewise threads on the outside for tool-holding heads. The spindle measures 6 inches on the bottom, and 4 inches on the top end. The spindle is counterbalanced, and has four changes of automatic feed, but can also be fed down by hand quick return wheel or lever, same as on our standard drills.

The distance between the housings on the machine shown is three feet, but this distance can be changed to suit the requirements of the case.

The ratio of the bevel gear and driving pinion is 4 to 1; the gear is made of cast iron 24 inches diameter, the pinion is

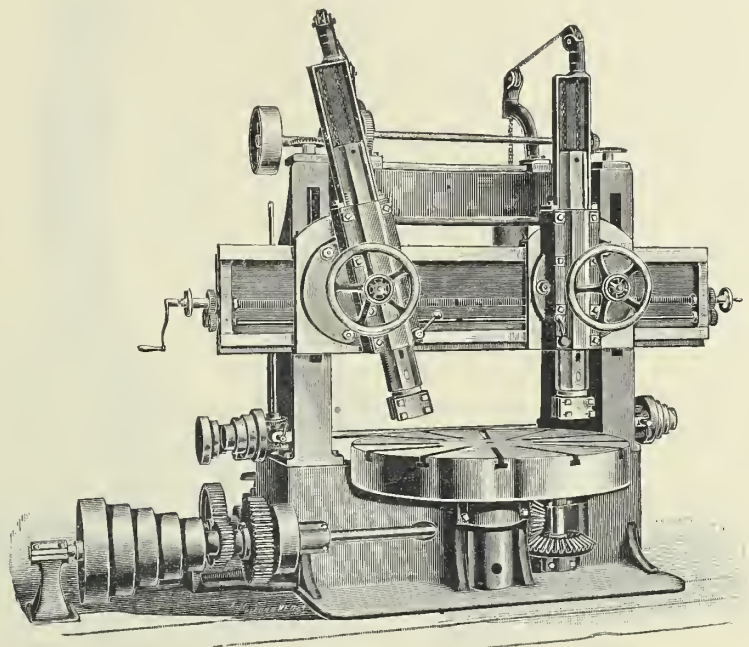
made of steel 6 inches diameter; both are 3-inch face and machine cut. The back gears are very heavy, 4 and 3 pitch gears, and the ratio is $6\frac{1}{2}$ to 1. The cone pulleys are 18, $15\frac{1}{2}$, 13 and $10\frac{1}{2}$ inches in diameter, $4\frac{3}{4}$ -inch face. The tight and loose pulleys are 22 inches in diameter and 5-inch face.

Weight, 9000 pounds.



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FIG. 206.



6 FOOT VERTICAL BORING AND TURNING MILL.

THESE mills are furnished with single or double heads, heavy, strong and powerful, self-contained and complete, with new and superior features. On the double mill the heads are right and left, so as to work close together, and will feed entirely independent. The tool spindles are 6 inches in diameter, octagon, bearing on alternate sides, which furnishes an excellent bearing with very little friction, and provisions for taking up wear, oiling, etc. The spindles operate at any angle, have quick hand adjustment, and powerful automatic feed in any direction, and counterbalanced in any position. Have steel tool-holders, which may be removed to use boring bars. Working parts are large, strong and carefully fitted. All gears are cut from the solid. Internal spur gear full size of table, insures steady and powerful motion, devoid of lifting or chattering tendencies.

SPECIFICATIONS.

5 FOOT MILL.

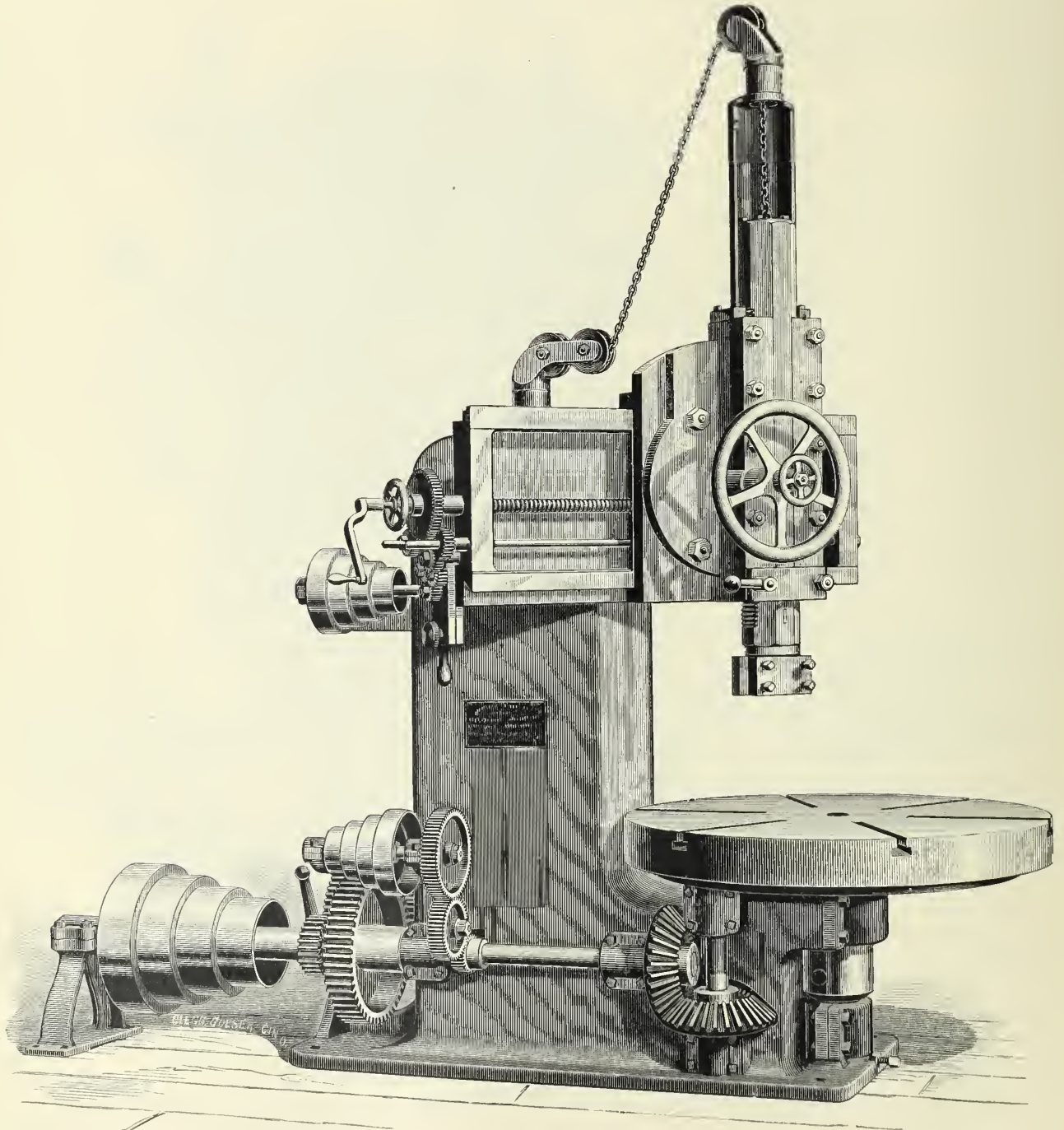
Size of base, 63 x 78 inches.
 Extreme height, 11 feet.
 Table, 54 inches in diameter, with 10 inch spindle 4 feet long.
 Takes 62 inches between uprights and 38 inches under cross rail.
 Tool spindle feeds 24 inches.
 Tight and loose pulleys, 24 inch diameter, 5 inch face, and should run 130 revolutions.

6 FOOT MILL.

Size of base, 63 x 90 inches.
 Extreme height, 11½ feet.
 Table, 62 inches in diameter, with 12 inch spindle 4 feet long.
 Takes 74 inches between uprights, and 40 inches under cross rail.
 Tool spindle feeds 30 inches.
 Tight and loose pulleys, 24 inch diameter, 5 inch face, and should run 130 revolutions.

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FIG. 207.



FOUR, FIVE AND SIX FOOT BORING AND TURNING MILLS.



FOUR, FIVE AND SIX FOOT BORING AND TURNING MILLS.

OUR SINGLE COLUMN BORING AND TURNING MILL will be found one of the most useful machine tools which can be placed in any machine works. The work can be chucked on the table much easier than in a lathe, and after being placed on the table and resting thereon, it can be wedged up and set in a shorter time. The center of the tool spindle can be brought to the center of hole in table, and then by using boring bars, such work as fly wheels, pulleys, truck wheels, etc., can be bored the same as on a special boring machine. By substituting the tool holder in place of the boring bar, any casting may be faced, bored or turned, as large in diameter as swing of machine, and as high as distance between table and cross rail. The tool spindle is octagon shape, with bearing on alternate sides, thus giving the best possible bearing with little friction and excellent provisions for taking up the wear. The spindles can be operated at any angle, have quick hand adjustment and very powerful automatic feed in all directions. The column is so designed that when doing work of large diameter the spindle is brought directly opposite the column, thus giving the best support possible.

Spur gearing is used under the table, which gives a smooth and steady motion, free from all the lifting and chattering tendencies of bevel geared machines. All gearing is cut from the solid, and all shafts are of steel. Only strictly genuine Babbitt metal is used in all boxes. The cross rails, saddles, spindles, and all journals are carefully scraped to a perfect bearing. The table is extra heavy, running in large journals, and resting on a tempered step, is adjusted by a taper key which is operated by the screw in front of the base. The cone pulleys are very large and have a wide belt surface.

The machines throughout are very heavy, strong and convenient, and we guarantee them perfectly true and accurate in every respect. Only the very best material and workmanship are used in their construction.

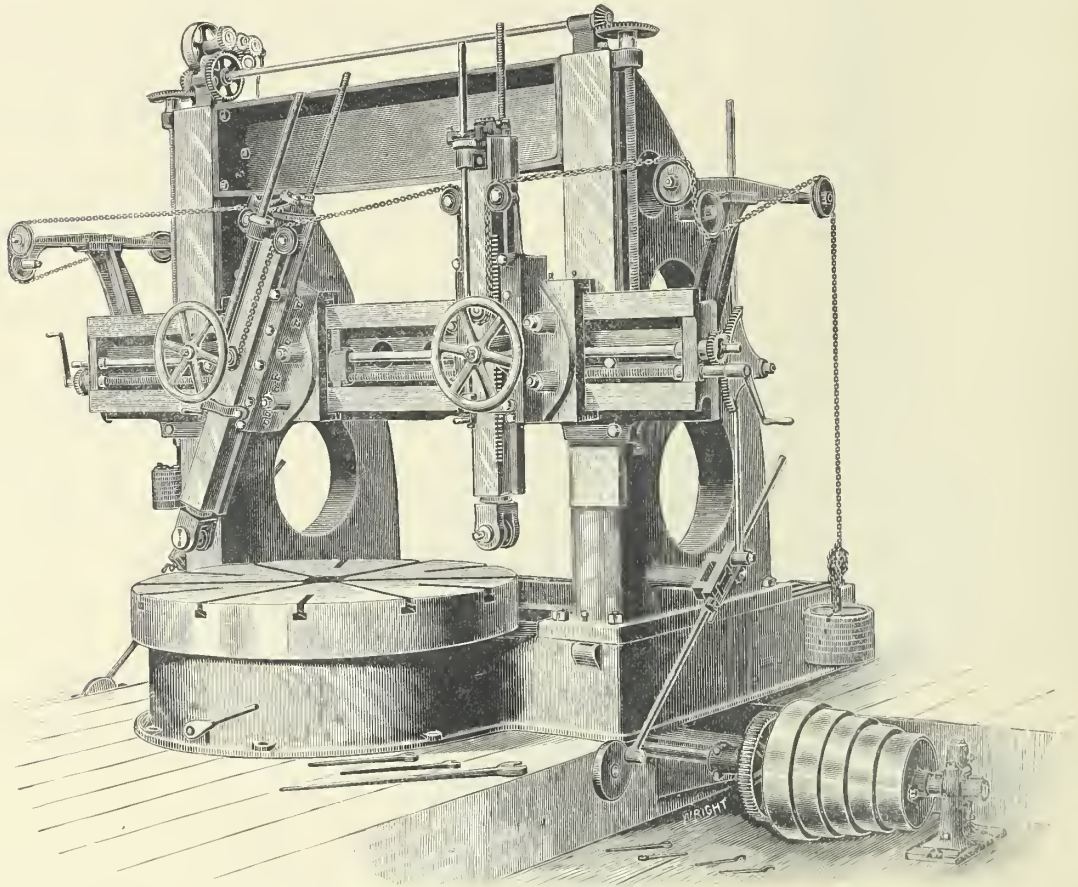
We also furnish, when desired, any of these machines with two heads on the cross rail.

SPECIFICATIONS.

Dimensions and weights,	- -	48-INCH MILL.	60-INCH MILL.	72-INCH MILL.
From top of table to floor,	- -	29 inches	31 inches	31 inches
From top of table to bottom of rail,		27 inches	31 inches	29 inches
Diameter of table,	- - - -	48 inches	60 inches	72 inches
Floor space of housing,	- - -	5 feet 7¾ inches x 2 feet 6½ inches	7 feet 2½ inches x 3 feet 3 inches	7 feet 3 inches x 3 feet 6 inches
Floor space of mill set up,	- -	9 feet 5 inches x 4 feet	12 feet x 5 feet	12 feet 6 inches x 6 feet
Height from floor to top of chain roller,		9 feet 9 inches	9 feet 2½ inches	10 feet 6 inches
Width of table,	- - - -	5 inches	6¼ inches	6¾ inches
Sizes of cone pulleys,	- - -	18½, 16, 13½ and 11 ins. x 4½ inch face	20½, 18, 15½, 13 and 10½ ins. x 4¾ ins. face	20½, 18, 15½, 13 and 10½ ins. x 4¾ ins. face
Sizes of table spindle,	- - -	8 inches on top, 5 inches on bottom bearing	10 ins. on top, 8 ins. on bottom bearing	10 ins. on top, 7¾ ins. on bottom bearing
Pitch diameter of internal spur gear,		38⅔ ins. x 3⅝ ins. face	45⅓ ins. x 3⅝ ins. face	45⅓ ins. x 3⅝ ins. face
Pitch diameter of driving pinion,	-	7⅓ ins. x 3⅝ ins. face	7⅓ ins. x 3⅝ ins. face	7⅓ ins. x 3⅝ ins. face
Octagon spindle across sides,	- -	6 inches	6 inches	6 inches
Size of tight and loose pulleys,	-	22 x 5 inches	26 x 5 inches	26 x 5 inches
Width of belt for cone pulleys,	-	4½ inches	4½ inches	4½ inches
Speed of countershaft,	- - -	90 revolutions	90 revolutions	80 revolutions
Weight, about	- - - -	8500 pounds	11000 pounds	14000 pounds

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FIG. 208.



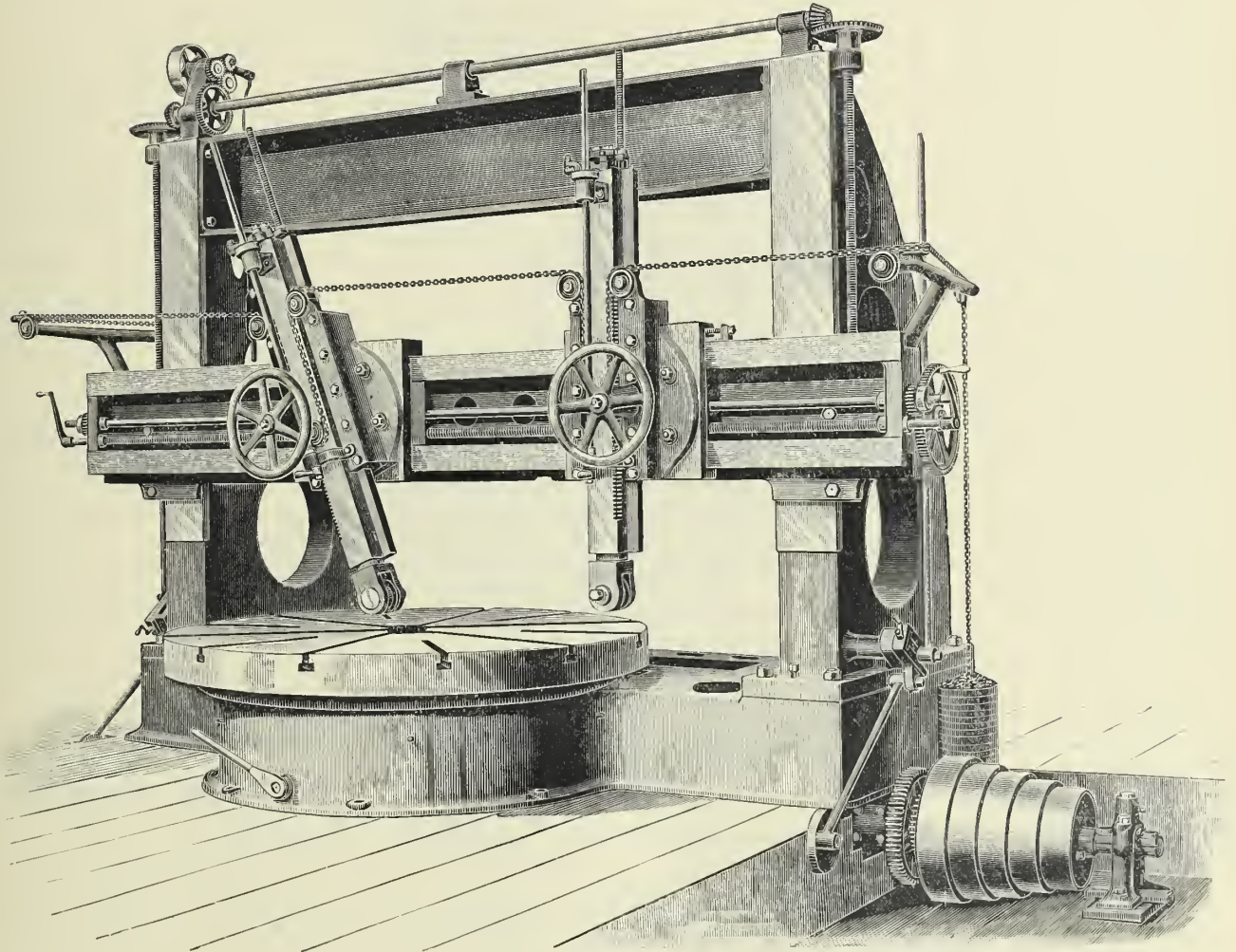
7 FOOT VERTICAL TURNING AND BORING MILL.

THESE MILLS are vertical and have capacities as named in the specifications.* With the arrangement of gearing the operator is able to get a great number of speeds on the tables. The cross rails are moved by power, and we always advise the use of two saddles on them, one of which will move to the center for all such work as boring, and the other will approach as near the center as ever will be required on any class of work on which two tools can be used advantageously; the vertical spindles have quick hand return, and are counterbalanced. The feeds are entirely independent of each other in all of their movements. An annular bearing is provided, on which the table can be run when on heavy work.

* For specifications see page 211.

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FIG. 209.



TEN FOOT VERTICAL TURNING AND BORING MILL.



VERTICAL TURNING AND BORING MILLS.

SPECIFICATIONS.

Size of Mill,	-	-	-	-	5 Feet.	6 Feet.	7 Feet.	7-10 Feet.
Swings,	-	-	-	-	5 feet 5 inches	6 feet 5 inches	7 feet 5 inches	10 feet
Will take in work	-	-	-	-	3 feet 6 inches high.	4 feet high	4 feet 9 inches high.	4 feet 9 inches high.
Traverse of tool spindles,	-	-	-	-	24 inches	25½ inches	27 inches	27 inches
Changes of speed,	-	-	-	-	20	20	40	40
Weight,	-	-	-	-	20000 pounds	26000 pounds	33900 pounds	35500 pounds

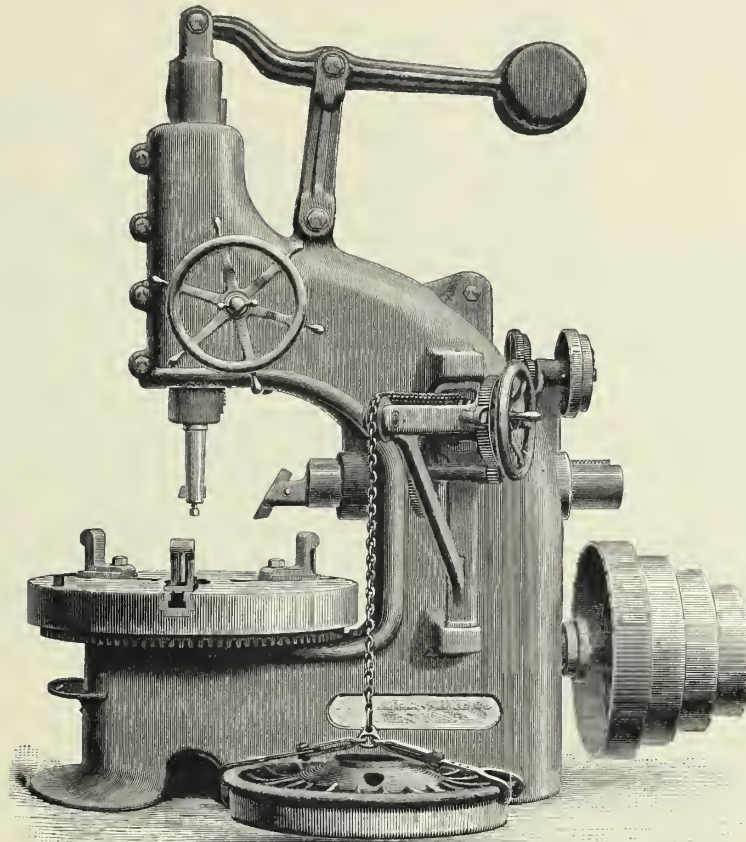
Size of Mill,	-	-	-	-	8 Feet.	9 Feet.	10 Feet.	10 Feet.
Swings,	-	-	-	-	8 feet 4 inches	9 feet 4 inches	10 feet 4 inches	Heavy Pattern 10 feet 4 inches
Will take in work,	-	-	-	-	4 feet 9 inches high.	4 feet 9 inches high.	4 feet 9 inches high.	6 feet high
Traverse of tool spindles,	-	-	-	-	27 inches	27 inches	27 inches	30 inches
Changes of speed,	-	-	-	-	40	40	40	60
Weight,	-	-	-	-	35900 pounds	37900 pounds	40300 pounds	60100 pounds

Size of Mill,	-	-	-	-	10-16 Feet.	12 Feet.	14 Feet.	14 Feet.
Swings,	-	-	-	-	16 feet	12 feet 4 inches	14 feet 4 inches	Heavy Pattern 14 feet 5 inches
Will take in work,	-	-	-	-	6 feet high	6 feet high	6 feet high	10 feet high
Traverse of tool spindles,	-	-	-	-	30 inches	30 inches	30 inches	48 inches
Changes of speed,	-	-	-	-	60	60	60	60
Weight,	-	-	-	-	63100 pounds	63100 pounds	67100 pounds	112700 pounds

Slotting attachments can be put on all Mills from 7 feet to 14 feet, inclusive.

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FIG. 210.



No. 1 IMPROVED CAR WHEEL BORING MACHINE,
WITH AUTOMATIC HUB FACING ATTACHMENT.

THE frame of this machine is very heavy, and of such construction as to give strength, convenience, and beauty of design. The boring spindle is of large proportions, and has sufficient run to meet all requirements, is counterbalanced, and provided with a steel cutter arbor $3\frac{3}{4}$ inches in diameter, with a taper bearing in main spindle of $11\frac{1}{2}$ inches.

The chuck has a combination of universal and independent jaws, and will receive wheels from 15 to 42 inches diameter; it runs on large double, elliptical, self-centering bearings, with Babbitt linings; chuck spindle is hollow, and allows chips to fall in the interior of the frame, where from either side of the machine they may be easily removed.

The driving gearing is strong and powerful; the driving cone is large, and has three changes of speed, and by the arrangement of the countershaft pulleys, admits of two speeds for each cone-shift without change of belt.

Is provided with a convenient side crane, with chain and grappling irons for lifting and swinging wheels on and off the chuck. Will bore straight or tapering; will also face the hubs of wheels.

The feeding arrangement for the boring spindle is convenient and effectual; there being two belt and two clutch feeds, the latter admits of being changed instantaneously, independent of the former.

Furnished with countershaft and wrenches.

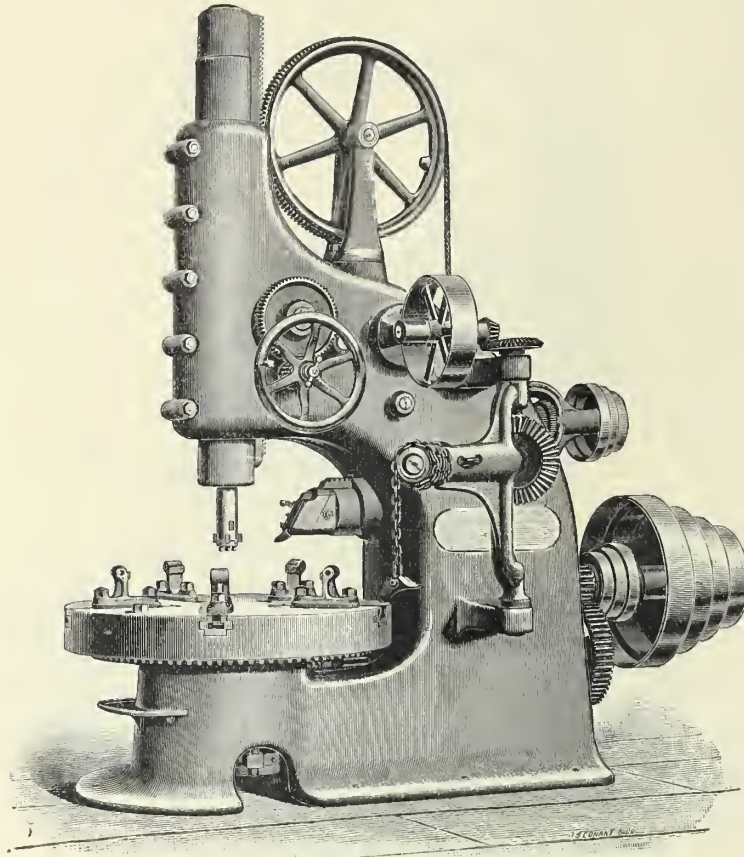
Friction pulley on counter, 28 inches diameter, 8 inch face.

Countershaft should make 80 and 90 revolutions per minute.

Weight, 9500 pounds. Power crane, extra. Automatic squaring-up attachment, extra.

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FIG. 211.



No. 2 IMPROVED CAR WHEEL BORING MACHINE,

WITH POWER CRANE, AUTOMATIC SAFETY STOP AND HUB FACING ATTACHMENT.

THIS is a new and advanced machine. Its weight, strength, and power is sufficient to meet the severest duty, and its capacity for production and endurance is in excess of any machine of its kind.

The chuck has five jaws arranged to be operated both universally and independently, will receive wheels from 15 to 42 inches diameter. The vertical pressure and end thrust of the cutter-head is received on an anti-friction ball bearing. The chuck spindle is of improved construction, and runs in a Babbitt-lined case, which provides for wearage, and retains the precision of the chuck relatively to the boring spindle; chuck spindle is hollow, borings, chips, etc., fall into a pit in the interior of the machine, where they may easily be removed.

The gearing throughout is powerful. Driving cone has four changes for five-inch belt, and by an improved arrangement of countershaft the momentum of the motive parts are checked by a friction brake when the machine is stopped.

The power crane is strong, quick, and fully controlled by the operator, will swing wheels to center of chuck, or will remove and lower them with rapidity.

Feeding arrangement is convenient and effectual. Vertical boring spindle is large and easily operated; is provided with take-up bolts, and has six changes of feed, ranging from $\frac{3}{8}$ to $\frac{3}{4}$ inch to one revolution of chuck. Spindle can be run up into the frame to clear the throat of machine, and give full play to the crane.

An improved safety stop is applied to boring spindle, which automatically stops the machine (after the cutters pass through the wheel) in case the operator fails to do so.

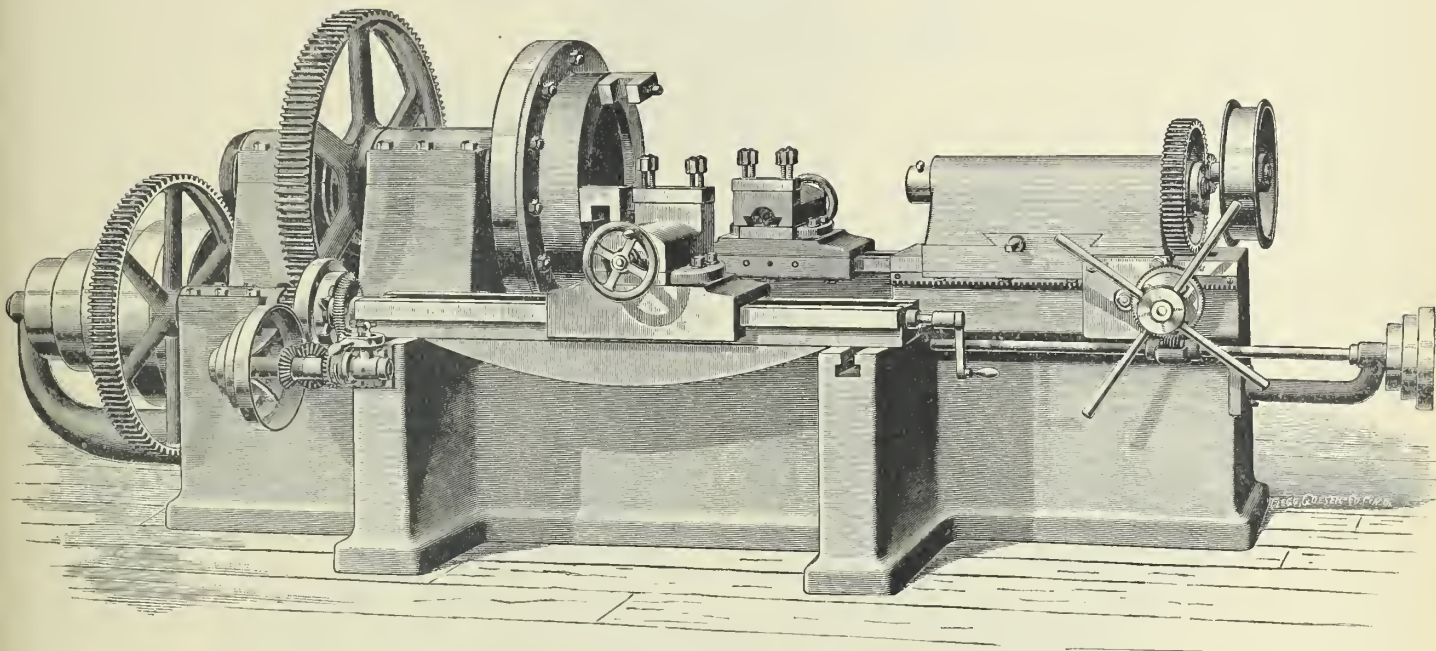
The hub-facing spindle can be worked by hand, or will operate automatically with the boring spindle; has a sliding head which adjusts the tool to its cut by screw and worm.

Machine will bore the holes of car or truck wheels either straight or tapering, as desired.

Machine is first-class in workmanship and material, and is furnished with countershafts, wrenches, etc., also with one patent cutter head. Friction pulley on countershaft, 28 inches diameter, 8 inch face. Countershaft should make 110 revolutions per minute. Friction pulley on countershaft to power crane, 16 inches diameter, 5 inch face. Countershaft to power crane should make 140 revolutions per minute. Weight, 18500 pounds.

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FIG. 212.



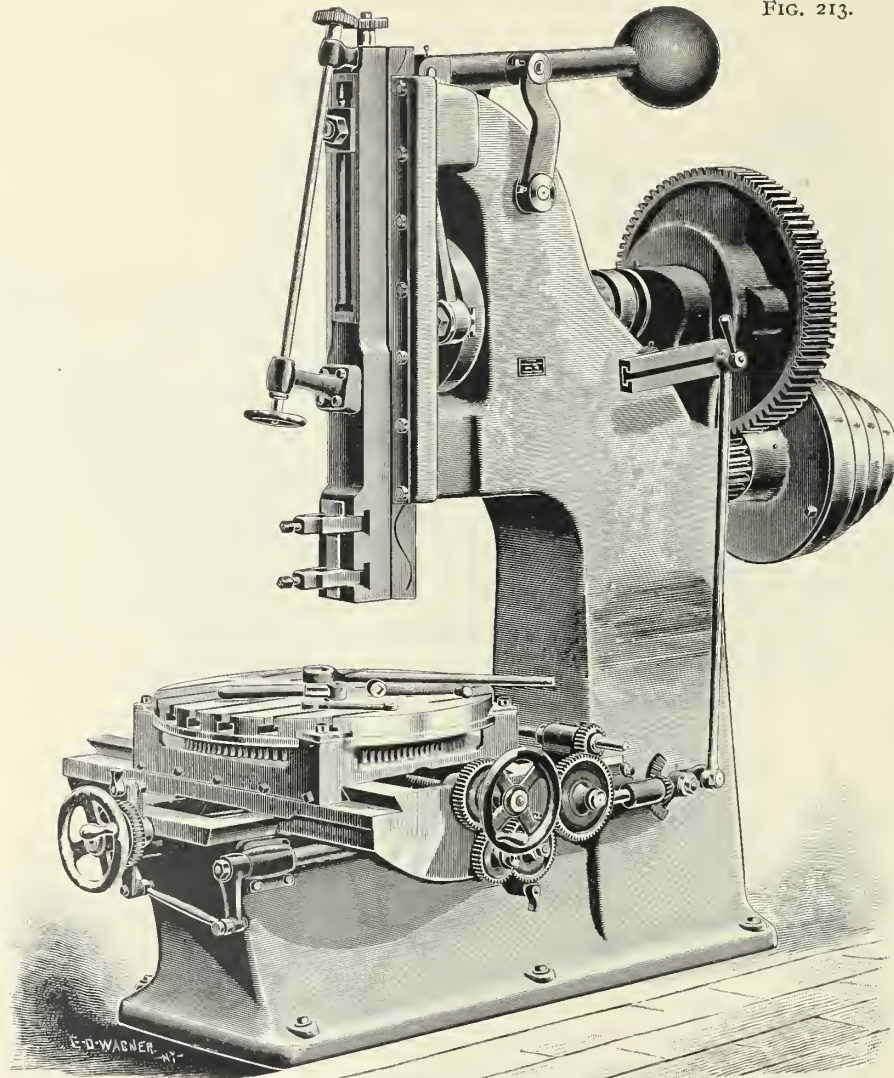
TURNING AND BORING MACHINE.

FOR FLY WHEELS AND CRANK DISCS.

THE necessity for a machine to turn fly wheels and crank discs and to bore them for both center and crank pin, without handling them separately for this operation, has been long felt by progressive engine builders. The machine herewith illustrated was designed to fill this requirement. The bed, which includes the head and footstocks together with the wings, is all one casting. The spindle is ten inches in diameter, thirty-six inches long, is hollow four and three-quarter inches its entire length. The nose of the spindle is fourteen and three-quarter inches in diameter, and is chased two threads to the inch, so that a face plate or chuck may be easily adjusted. The spindle is scraped into the headstock, which is provided with ample lubricating facilities, so that there is no possibility of any cutting. The cone pulley is of six grades, varying from 26 inches to 13 inches for $4\frac{3}{4}$ inch belt. The ratio of revolutions of the cone pulley to live spindle is sixty to one. The distance between head and footstock is forty-eight inches, and a piece of forty inches width by sixty inches diameter may be turned. The rails are of a box form of construction, and so designed that no stress ever brought to bear on them could produce a tremor. The rails are movable to and from the center, so that the machine will turn down to twelve inches; they also swivel so that pieces requiring a taper may be accurately handled. Power cross and angle feeds are supplied to the front tool post. A cross rail for turning small diameters may be supplied as an extra. A massive form of construction is adopted for the boring head in order that the most accurate results may be obtained. The especially desirable feature of the boring head is its set-over movement of twelve inches, enabling the machine to bore to a throw of twenty-four inches. The gearing shown gives a very powerful and steady cut to the boring bar. Boring head has power length feed, also pilot wheel for quick hand feed. The machine complete weighs about ten tons.

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FIG. 213.



13 INCH SLOTTING MACHINE.

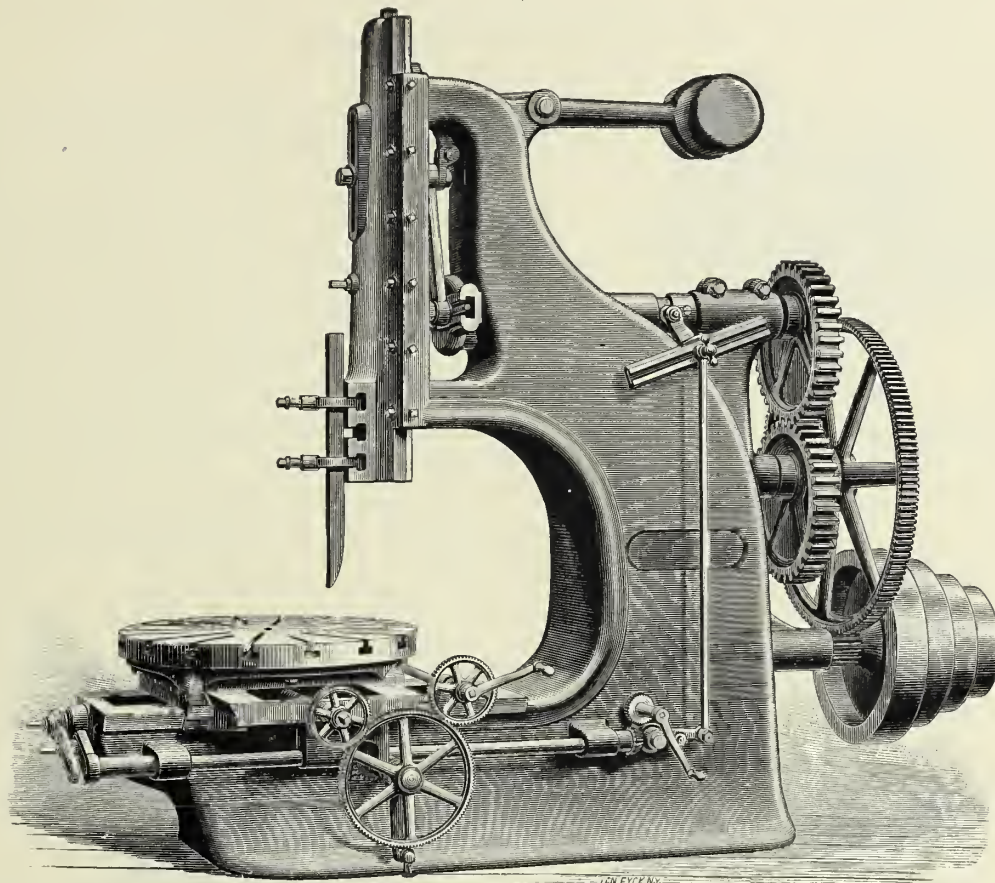
THE frame of this machine is wide and heavy, to insure stability and prevent spring. The ram is driven by the four speed cone and the gearing. The Whitworth "quick return" gives a quick upward and a slow cutting stroke to the ram. The stroke can be varied from 0 to 13 inches, and the change is quickly made by means of a screw in the crank disc. The position of the ram in regard to the work may also be quickly changed by the rod which is shown on the front of the ram. The counterbalance takes up the lost motion in the crank pin. The compound table is provided with a circular table, driven by a worm wheel and gear, with self-acting feeds in both directions, and the feeds take place always at the top of the stroke, and never during the cut, and it may be changed from fine to coarse by the feed crank. The circular table may be held rigidly by the clamps at the four corners. All the handles are within easy reach of the workmen. This is a very important feature, as work on the slotter requires close watching by the workmen, who should be able to operate all the handles without stopping the machine. All wearing surfaces are broad and scraped to a perfect bearing. All wearing screws and spindles are of steel. Countershaft and wrenches are included with the machine.

SPECIFICATIONS.

Large cone step, 26 inches x $4\frac{1}{4}$ inch face. Ratio of gearing, 1:4. Circular table, 31 inches diameter. Compound table feed, 21 inches longitudinally, and $27\frac{3}{4}$ inches across. Machine will slot the center of 57 inches. Distance from tool seat to inside of frame, 27 inches; from circular table to frame, 17 inches. Length of ram, 4 feet 4 inches. Weight, 10000 pounds.

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FIG. 214.



No. 4 PUTNAM SLOTTING AND PARING MACHINE.

THESE MACHINES have hand and power, cross, side and revolving, independent or connected variable feeds; quick return to rams which are counterbalanced to obviate jarring while cutting; driven by variable cranks which are adjusted to any amount of stroke by screw; are also arranged so that operator may vary height of the sliding bar conveniently while he is upon the floor. Frames are of good design, heavy, well-proportioned, and braced by side and internal ribs to give additional strength. Stock and workmanship throughout are of the best quality; surface fits are hand-scraped to test plates.

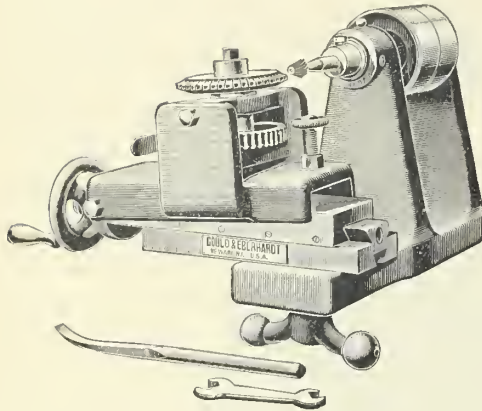
They are also furnished with the following valuable attachments: A patent relief motion, which greatly enhances the amount and quality of work produced over that of an ordinary slotter, which is accomplished without joint in the cutting tool or ram, thus giving the full strength of a solid tool while its cutting edge is not impaired by scraping against the article worked; will operate equally well on the outer or inner surface of any article, or upon the front or back side; it never requires to be altered or reset when the stroke of the machine is changed; can be quickly varied or thrown off at the will of the operator while the machine is in motion. The circular table is of such construction as to admit of its being rigidly secured to the saddle at any point in its circumference. Is accurately graduated into 360 degrees. Furnished with three tool holders for ram, wrenches, countershaft; with iron cone and patent friction driving pulley; also with improved friction brake for the purpose of instantly stopping the machine, or to facilitate in placing the cutting tools in proper position when changed or removed from the run.

SPECIFICATIONS.

	2	3	4
Number of machine, - - - - -	11	14	19
Length of stroke, - - - - -	40 inches	57 inches	74 inches
Will slot to center of circle, - - - - -	26 inches	33 inches	42 inches
Revolving table, diameter, - - - - -	18½ inches	24 inches	40 inches
Revolving table, in and out traverse, - - - - -	21 inches	25½ inches	41 inches
Revolving table, cross traverse, - - - - -	16 x 4½ inches	20 x 5½ inches	28 x 8 inches
Friction pulley on countershaft, - - - - -	110	100	85
Countershaft revolutions per minute, - - - - -	6000 pounds	8000 pounds	16000 pounds
Weight, - - - - -			

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FIG. 215.



CUTTER MACHINE.

THE MACHINE shown in cut is used in connection with the gear cutter, by those who make their own cutters, for the purpose of milling the teeth in them. This machine does the work in such a manner that the file is used only for rounding the corners. Those using a gear cutter should have one of them. They are sent complete, ready for the belt. Spindle, 400 revolutions per minute.

26 INCH GEAR CUTTER,

WITH LEVER FEED FOR LIGHT WORK.

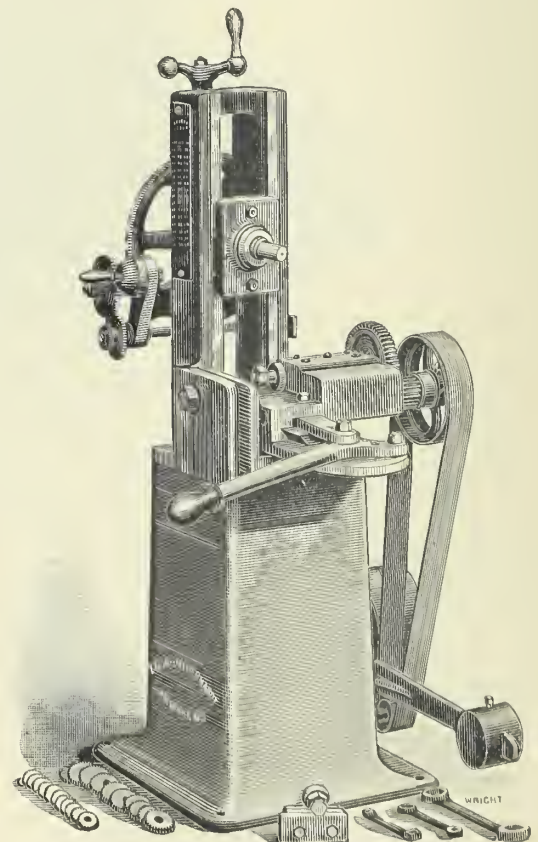
THE illustration shows the lever feed (or screw, if desired) machine for light work, which will cut gears from 0 to 26 inches in diameter and 6 pitch with accuracy and dispatch. It is well and substantially built.

It is furnished with an index and change wheels for cutting all numbers from 0 up to 50, and nearly every number up to 200.

Countershaft pulleys are $9 \times 2\frac{1}{2}$, and should make 95 revolutions.

Weight, about 550 pounds.

FIG. 216.





AUTOMATIC GEAR CUTTERS.

THESE MACHINES are so designed and built to turn out with ease the most severe class of gear cutting accurately and rapidly. Work of smaller size and pitch can be done equally well.

The driving arrangement is original and of simple construction, but one belt being used to drive the entire machine.

Variation of speeds is obtained by the changing of but one gear. No cone pulleys and no belt tighteners are used.

The cutter is placed in the center of the cutter carriage, and the feed screw is in the center, and so placed as to take the thrust in a direct line, thus insuring the least possible wear on the slide bearings, etc. The cutter spindle is so designed that the cutters can be taken out and replaced without the removal of the bearings, and various size arbors can be inserted without loss of time.

A new and very important system we are introducing is a suitable pan cast around the base of the machine for holding a lubricant, which is pumped to the cutter, thus keeping the cutter and cast-iron wheel cool. This preserves the cutting edges of the cutter, so that the cutter can do about three to six times the work before requiring sharpening than when cutting dry.

By reference to the cuts of the machine, it will be noticed that the machine, in all its parts, possesses that massive simplicity of design, which makes the machine very rigid, and at the same time, the simplest machine to run and adjust.

Changes of feed are made with gearing; a large range of feeds can be obtained, proper index being fastened to the door of the apron.

The quick return to cutter slide is uniform; changing the feed does not change the speed of the return.

The feed gearing, clutches, etc., are all enclosed with a neat guard or box. This guard is cast in one piece with all the shaft bearings (which are composition lined), thus connecting all the bearings and assuring perfect alignment and long wear.

A good method of automatically lubricating the bearings, etc., is adopted.

The chips are removed from under the cutter automatically, deposited at the base of the machine where they can be caught in a receptacle and removed. Little is left for the workman to do, after starting the machine, but to take the finished wheel out and put in another blank.

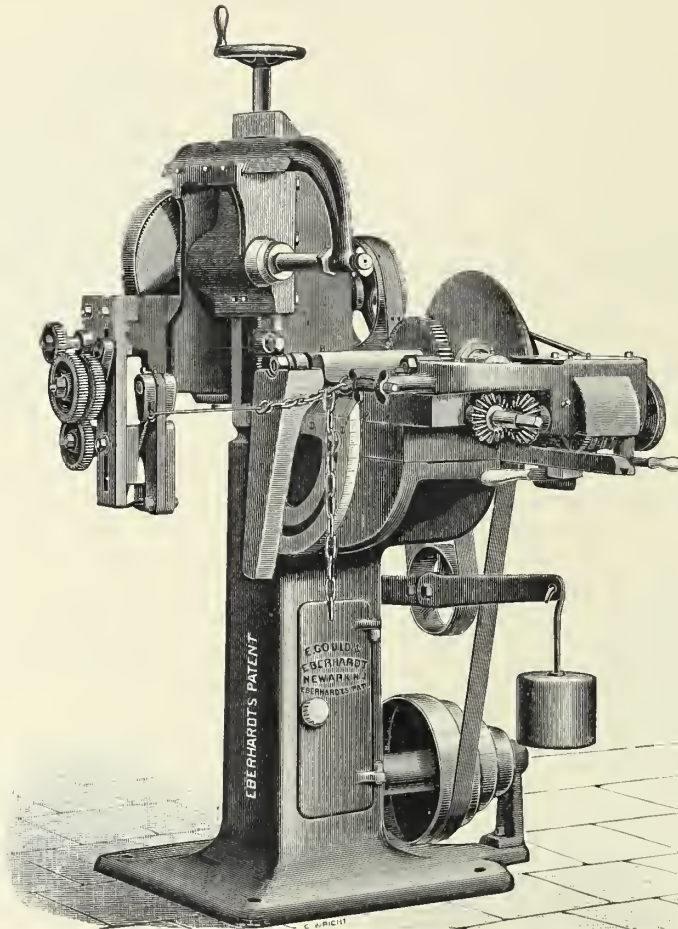
In point of accuracy, our machine is practically perfect. The worm dividing gear is large and the teeth are of a coarse pitch. The worm wheel is well covered over with a neat guard, thus keeping it free from dirt and chips. A suitable casing is provided, fastened to the side of the machine, for holding the set of change gears when not in use.

SPECIFICATIONS.

Will cut diameter in inches, - - -	25	40	50	60	72	84	120
Face in inches, - - - - -	8	12	12	16	16		
Pitch, diametral, - - - - -	3	2	1 3/4	1 1/2	1 1/2	1	1
Diameter of arbor to place cutters, -	1 1/4 in.	1 1/4 in.	1 1/4 & 1 1/2 ins.	1 1/4 & 1 1/2 ins.	1 1/4 & 1 1/2 ins.	1 1/4 & 1 1/2 ins.	
Class of work, - - - - -	Med.	Med.	Med. and Hea.	Med. and Hea.	Heavy	Heavy	Heavy
Shipping weight, about - - - - -	3400	4400	6000	11000	11500	12800	
Boxed weight, about - - - - -	3900	5000	6800	11800	12500	13800	
Counter pulleys, - - - - -	14 x 4	16 x 4	16 x 6	20 x 6	20 x 6	20 x 6 1/2	20 x 6 1/2
Revolutions for countershaft pulleys, -	250	200	200	200	200	180	180

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FIG. 217.



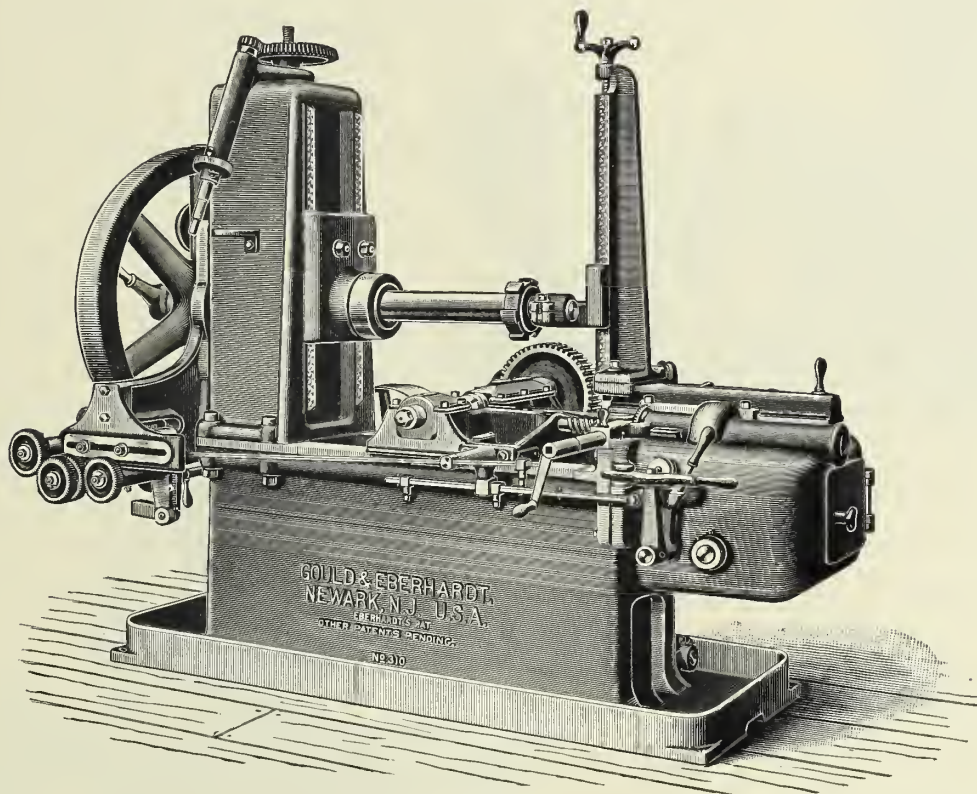
22 INCH ENTIRELY AUTOMATIC GEAR CUTTER,
FOR CUTTING SPUR, BEVEL, AND WORM GEARS.

THIS MACHINE was designed to meet a want for cutting spur and bevel gearing, of small diameters, with accuracy and dispatch. It is capable of performing work within the range of its capacity much quicker than could be accomplished on a larger machine. Its manipulation is very simple and workings are complete, very little floor space being required. Its construction is a modification of our well-known Universal Automatic Gear Cutters, all parts being built with the same degree of accuracy. The worm dividing wheel is in sections, thus securing perfect accuracy. The feed is variable instantaneously, and has very quick return to slide. Cutter shaft has three changes of speed. Worm can be dropped from wheel for testing gears. It has an overhanging arm for supporting the outer end of mandrel, or for work "between centers." It will cut every number up to 100, all except prime numbers to 200, and a very large range of higher ones. The column is hollow, forming a receptacle for cutters, gauges, etc. It is furnished complete with countershaft and all necessary wrenches.

For table of specifications see page 223.

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FIG. 218.



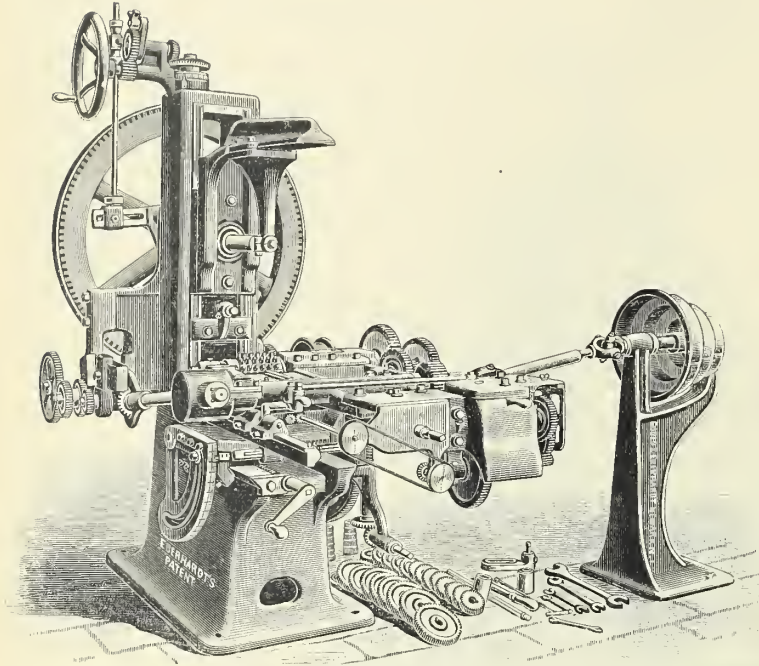
NEW TYPE ENTIRELY AUTOMATIC GEAR CUTTER.

ARRANGED FOR CUTTING SPUR GEARS ONLY.

For general specifications and description, see page 223.

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FIG. 220.

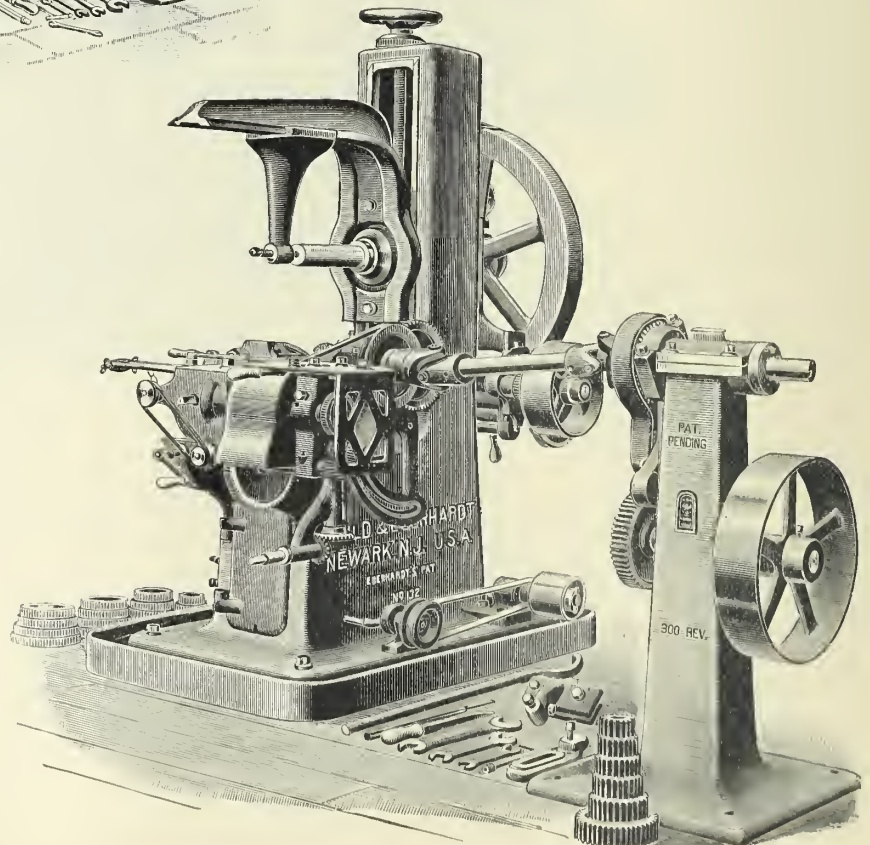


ENTIRELY AUTOMATIC GEAR CUTTER.

ARRANGED TO AUTOMATICALLY HUB WORM
GEARS WITHOUT GASHING.

30 inch; both spur and full automatic; has
driving stand like illustration.

FIG. 221.



30 INCH ENTIRELY AUTOMATIC GEAR CUTTER,

FOR SPUR BEVEL AND WORM GEARS.

Machine to cut spur gears only, Has
belt tightener; no stand. Automatic oil
pump and pan shown are charged extra.

*For general specifications and descriptions,
see page 223.*



ENTIRELY AUTOMATIC GEAR CUTTERS.

GENERAL DESCRIPTION.

THESE MACHINES embody the very latest improvements and are unquestionably the best of their class manufactured. They have V tooth worm and worm dividing wheel, adjustable rim support to take the strain of cutter on large wheels, and allow withdrawing the worm from dividing wheel to test large wheels before cutting them. The bearings and wearing surfaces are large.

They will cut a smooth tooth without chatter, and have an unlimited range of feed as any combination of the 37 change gears are at the workman's command. An index accompanies each machine, stating the proper gears to use for the various pitches, thus avoiding all guess work.

They have quick return to the cutter carriage, which is uniform and is not affected by changing the feed.

They have a rigid outward support to cutter arbor on the larger size machines.

They carry away the chips automatically.

They have dial for setting cutter to within a thousandth of an inch in depth.

They have gauge to set the cutter exactly to center of mandrel.

They have graduation for setting over for worm wheels and bevel gears.

They have graduated quadrant for cutting bevel gears.

They have large and quick adjustment of cutter shaft for cutting bevel gears.

They have an overhanging arm for supporting the outer end of gear blank mandril, or for work between centers. The arm is of such a shape that the sliding bearing may be removed entirely to examine or test work; the latter, on being put back, is always sure to be in perfect alignment with center of gear mandrel. With a round overhanging arm it is not positive, and is done with difficulty.

They have change gears that will cut every number up to 100, all but prime numbers to 200, and a large range of higher ones.

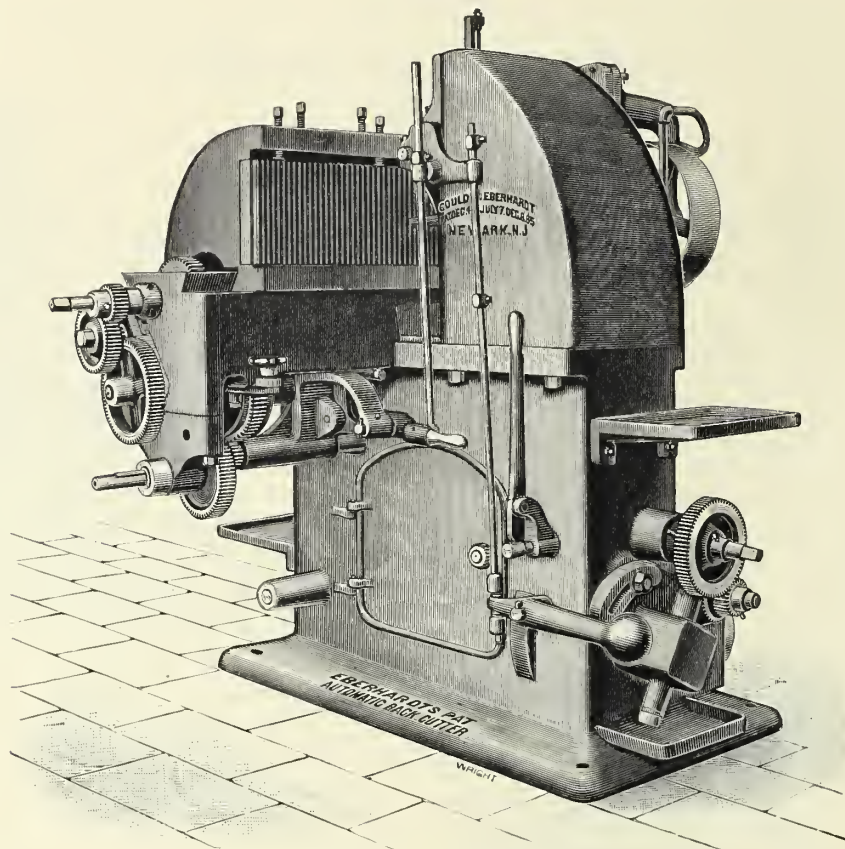
Every machine is fully guaranteed to work satisfactorily.

SPECIFICATIONS.

Will cut diameter in inches,	22	30	36	50
Face in inches, - -	5	8	10	11
Pitch, diametral, - -	6	5	3	3
Diameter of arbor to place cutters,	1 1/4 inches	1 1/4 inches	1 1/4 inches	1 1/4 inches
Class of work, - -	Light only	Light and medium	Medium and heavy	Medium and heavy
Shipping weight, about - -	1300	2300	3600	4200
Boxed weight, about - -	1600	2700	4200	4800
Countershaft pulleys, - -	9 x 3	9 x 3	12 x 4	12 x 4
Revolution for pulleys, -	250	250	250	250

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FIG. 222.



ENTIRELY AUTOMATIC RACK CUTTER.

THIS MACHINE was designed for cutting the teeth of racks entirely automatic and holding the work in the best possible position.

As will be seen from the engraving, the blank to be cut is placed in a vertical position, the sliding head carrying the cutters, also traveling in a vertical plane, being counterbalanced.

Among the principal advantages gained by this construction, though at first sight seeming small, is the easy and accessible way made possible to remove the chips or cuttings, as well as to direct and control oil or other lubricants for cooling and aiding the cutters in their work.

It also affords convenience in both setting, inspecting and testing the work. Naturally the chips fall and are caught in a receptacle just below the cutters, in which revolves a coarse threaded screw, which by means of a telescopic pipe, the chips are delivered at the side of the machine, convenient to be caught in a box and removed.

Gang Cutters.—When using these, cutting points are set spirally, as shown in the cut, avoiding chatter and rapid dulling of the edges.

Capacity.—The machine shown will cut a rack of either circular or diametral pitch, with accuracy, 8 inches wide by 3 feet long at one setting, and as coarse as 2 inches circular pitch, carrying from one to twelve cutters at a time, according to the pitch. It is capable of cutting 24 inches of $1\frac{1}{4}$ inches pitch, 4 inches face, cast iron rack in one hour.

The table can be geared to use the movement when traveling, for cutting in either direction, not requiring the return of the same end of table to commence the cutting, thereby causing the least wear to the parts.

Work of regular as well as irregular shape will be found very convenient to fasten to this style of table, which is arranged to stop automatically at each end of the work.

Feeds.—Change wheels are provided for cutting the various pitches.

Large bearings and wearing surfaces, carefully scraped and fitted, together with a well and evenly distributed amount of metal, are characteristics of this machine. We will construct machines to cut racks of any length at one setting. We furnish countershaft, wrenches, etc., necessary to operate the machine. Countershaft has tight and loose pulleys, 14 inches by 4 inches, 275 revolutions. Weight, about 5000 pounds.



PUTNAM 10 FOOT ENTIRELY AUTOMATIC RACK CUTTING MACHINE.

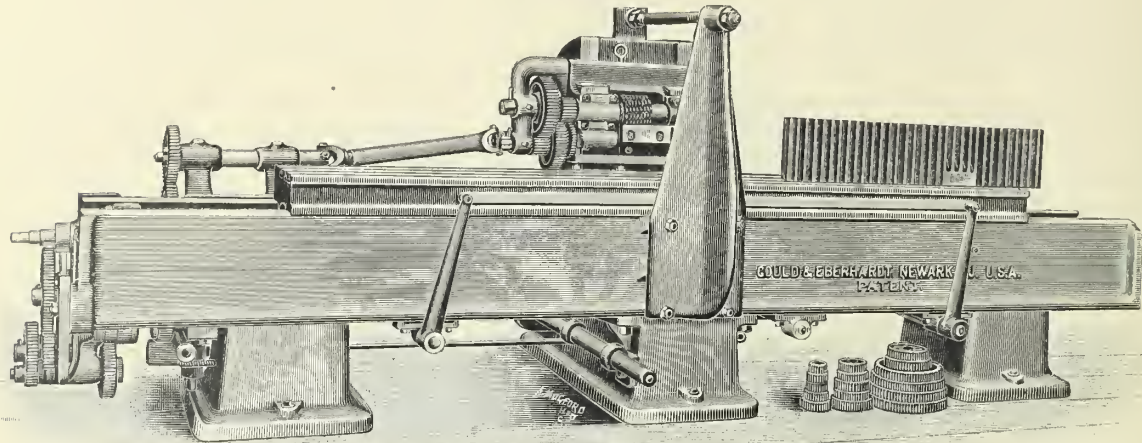
(See Photo. for Illustration.)

THIS MACHINE is entirely automatic in its movements, and designed to accurately cut all descriptions of racks within its capacity, *i. e.*, 10 feet long 12 inches wide. The cutter can be raised from the platen 14 inches. As usually made, all diametrical pitches from 2 to 10, inclusive, can be cut. Circumferential pitches can be substituted for diametrical, if wanted, and so stated when ordered. The division or spacing, is accomplished in a simple and positive manner, and is so constructed that it is impossible to cut any pitch except that indicated by the pitch gearing. The depth of cut is adjusted by a dial graduated to 1-1000 inches. The return of the cutter slide is 52 to 1 of the feed. The moving parts are heavy, to absorb all vibrations of the cutters, while the entire weight of the machine is about 10000 pounds. All parts of the machine are accurately fitted. Furnished with countershaft and wrenches.

Tight and loose pulleys on countershaft, 16 inches diameter, 5 inch face.

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FIG. 223.



ENTIRELY AUTOMATIC RACK CUTTER.

THIS MACHINE was designed for cutting the teeth of racks entirely automatic and holding the work in the best possible position. The machine is driven by one friction clutch pulley, operated by a starting lever from the side convenient for the operator.

A new and original feature of this machine is that all changes of speed are made without the employment of cones or the shifting of belts, it being necessary to change only one gear in order to obtain the speed required.

This construction not only increases the life of the driving belts, but also obviates many of the annoyances resulting from the use of cones. As will be seen from the engraving, the blank to be cut is placed in a vertical position, the sliding head carrying the cutters, also traveling in a vertical plane, being counterbalanced by a weight suspended from the ceiling.

Among the principal advantages gained by this construction, though at first sight seeming small, is the easy and accessible way made possible to remove the chips or cuttings, as well as to direct and control oil or other lubricant for cooling and aiding the cutters in their work.

It also affords convenience in setting and testing the work. Naturally the chips fall and are caught in a receptacle just below the cutters, in which revolves a coarse threaded screw, which, by means of a telescopic pipe and second conveyor, the chips are delivered at the side of the machine, convenient to be caught in a box and removed.

Gang of Cutters.—When using these, the cutting points are set spirally, as shown in the cut, avoiding chatter and rapid dulling of the edges.

The cutter spindle is geared very strong, driven by means of a sliding sleeve and universal joint, which readily compensates for all movements the slide may make, in cutting various widths of face, dispensing with belt tighteners, etc.

A heavy brace is placed opposite the cutter slide to connect with the top of head, to prevent any tendency of springing when cutting coarse pitches.

Capacity.—The machine shown will cut a rack of either circular or diametrical pitch, with accuracy, 10 inches wide by 10 feet long at one setting, and as coarse as 3 inch circular pitch; carrying from one to twelve cutters at a time, according to the pitch.

The table can be geared to use the movement when traveling, for cutting in either direction, not requiring the return of the same end of table to commence the cutting, thereby causing the least wear to the parts.

Work of regular as well as irregular shape will be found very convenient to fasten to this style of table, which is arranged to stop automatically at each end of the work.

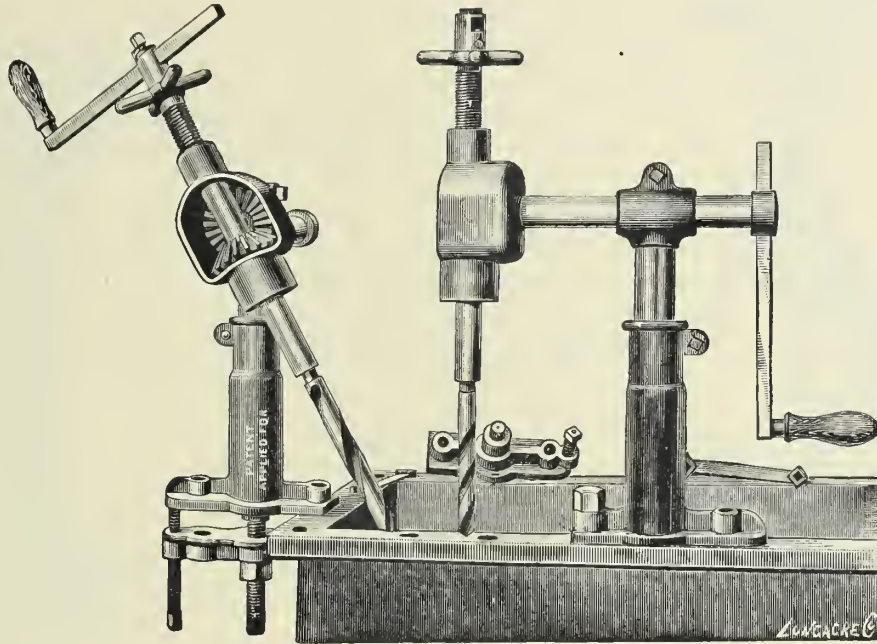
Feeds and Speeds.—Change wheels are provided for cutting the various pitches as well as for the necessary feeds.

Large bearings and wearing surfaces, carefully scraped and fitted, together with a well and evenly distributed amount of metal, are characteristics of this machine. We will construct machines to cut racks of any length at one setting. We furnish countershaft, wrenches, etc., necessary to operate the machine.

Countershaft, tight and loose pulleys, 18 x 6 inches, 175 revolutions. Weight, about 12000 pounds.

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FIG. 224.



No. 2 HAND DRILL.

THIS size will drill holes up to $\frac{7}{8}$ of an inch in diameter, and is so constructed that the crank can be used either at the end of the arm or at the end of the spindle.

The crank is also made adjustable in length, so that by using it longer or shorter the correct speed can be obtained for the size of drill used.

The arm has a reach of $9\frac{1}{2}$ inches, drilling at one setting anywhere over a surface of 19 inches outside diameter and 8 inches inside diameter.

The spindle has $3\frac{1}{2}$ inches traverse, and contains a No. 2 Morse taper socket. By loosening the clamp bearing on the post the spindle can be set at any angle.

The post has 5 inches vertical adjustment to allow for the use of different lengths of drills and reducing sockets.

By using the bottom clamp of the base the drill can be fastened to a bench, or with the clamp and stud removed it can be bolted to any flat surface.

Weight of machine is 33 pounds. Weight, boxed for shipment, is 55 pounds.

No. 3 HAND DRILL.

THIS size is similar in construction to the No. 2 Hand Drill above described, with increased range and power, being capable of drilling holes up to $1\frac{1}{4}$ inches in diameter.

The arm has a reach of 12 inches, drilling at one setting anywhere over a surface of 24 inches outside diameter and 9 inches inside diameter.

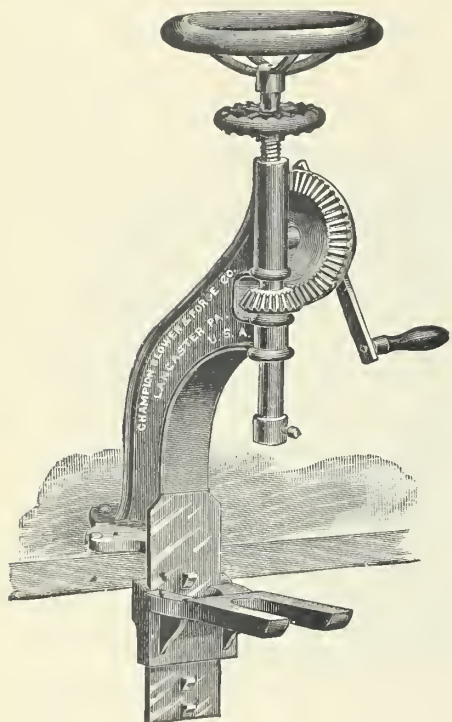
The spindle has 4 inches traverse, and contains a No. 3 Morse taper socket.

The post has 5 inches vertical adjustment to allow for the use of different lengths of drills and reducing sockets.

Weight of machine is 50 pounds. Weight, boxed for shipment, is 95 pounds.

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FIG. 225.



IMPROVED BENCH DRILL.

THIS BENCH DRILL has adjustable bed plate, 26½ inches high; drills up to ½ inch feed, has a run of 3½ inches. The crank can be lengthened or shortened. The feed is easily operated. It takes ¾ round or square shank drill bits. Two chucks are furnished with Drill. Weight complete, 34 pounds.

IMPROVED SENSITIVE BENCH DRILL.

THIS TOOL is designed for light rapid drilling up to 5-16 holes. It is the result of several years' experience with this class of drills, and it is especially adapted for the use of manufacturing Jewelers, Electricians, Mathematical Instrument makers, and for light drilling generally.

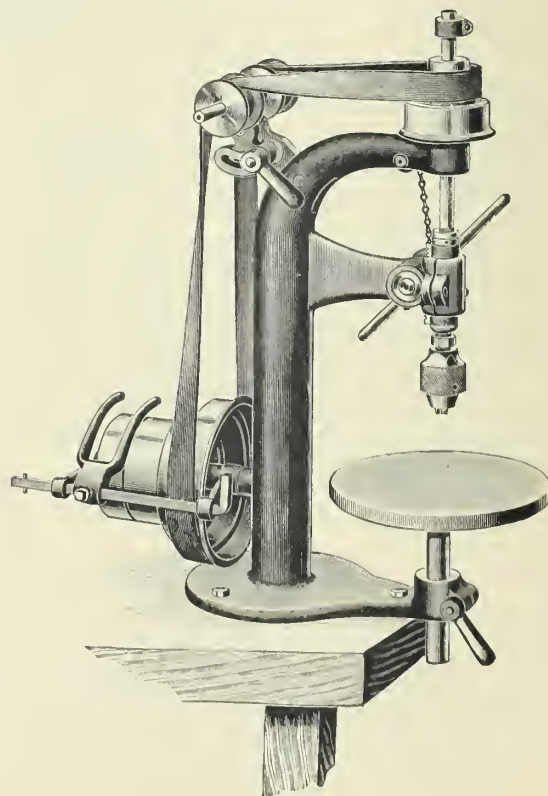
The spindle is driven by a 1 inch flat belt. It has two speeds, a cut steel rack and pinion feed, and an adjustable stop to gauge the depth of holes. It is entirely relieved of belt strain, and is counterbalanced by a weight, inside of frame, making it extremely sensitive and uniform to the touch. It is also provided with means for taking up wear or lost motion, and is fitted to "Almond," "Skinner," or other standard drill chuck.

The spindle pulley is so arranged that it will not throw oil in the operator's face.

The countershaft is attached to the frame and can be placed directly under your line shaft, thus avoiding the trouble and expense of putting up a countershaft.

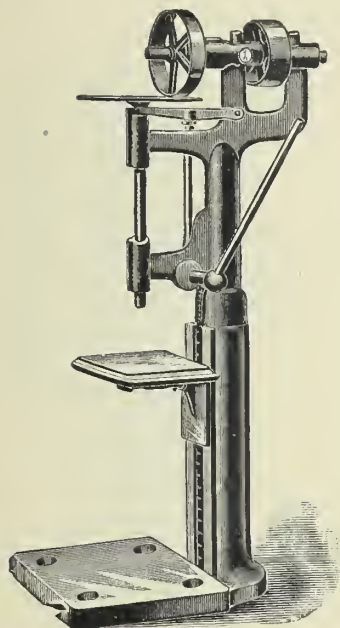
Speed.—It can be run at a very high rate of speed, as the pulleys are turned inside and out, and all the rotary parts are perfectly balanced.

FIG. 226.



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FIG. 227.



No. 2 FRICTION BENCH DRILL.

THIS DRILL has the greatest power when speed is slow, and is the most sensitive when speed is high.

SPECIFICATIONS.

It will drill from 0 to $\frac{3}{8}$ inches, and from center of 10 inch circle.

Greatest height from base to spindle, - - - - -	20 inches
Greatest height from platen to spindle, - - - - -	13 inches
Distance from column to spindle, - - - - -	5 inches
Diameter of column, - - - - -	$3\frac{3}{4}$ inches
Diameter of spindle, - - - - -	$\frac{7}{8}$ inch
Size of table, - - - - -	9 x 11 inches
Speed of driving pulley, - - - - -	600 revolutions
Speed of drills, - - - - -	400 to 1500

Spindle fitted for No. 1 Morse taper. Weight, 115 pounds.

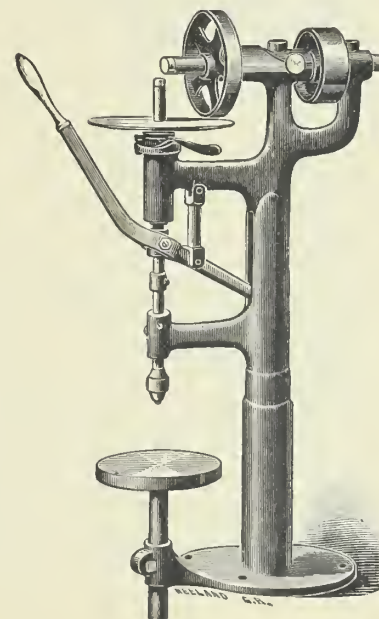
No. 4 FRICTION BENCH DRILL.

SPECIFICATIONS.

It will drill from 0 to $\frac{3}{16}$ inches.

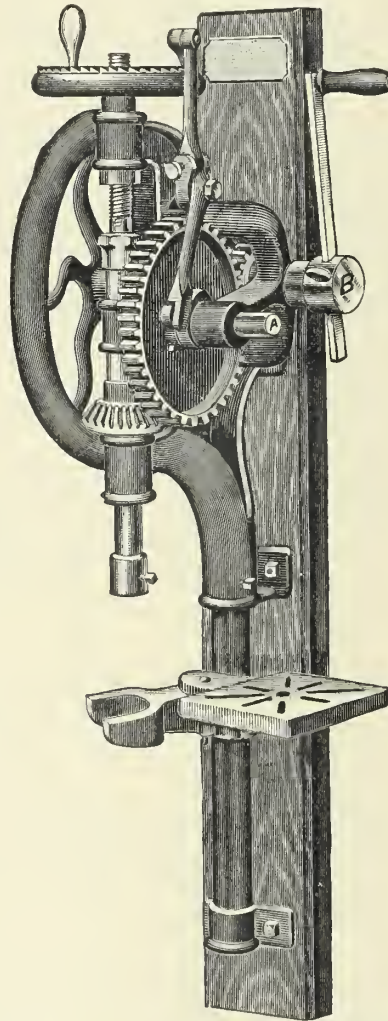
Greatest distance between table and chuck, - - - - -	$6\frac{1}{2}$ inches
Diameter of table, - - - - -	6 inches
Distance from center of table to column, - - - - -	$4\frac{1}{2}$ inches
Diameter of spindle, - - - - -	$\frac{9}{16}$ inches
Vertical movement of spindle, - - - - -	$2\frac{1}{4}$ inches
Size of driving pulley, - - - - -	$1\frac{1}{2} \times 3\frac{1}{2}$ inches
Speed of driving pulley, - - - - -	800 revolutions
Speed of drills, - - - - -	800 to 2000
Weight, - - - - -	35 pounds

FIG. 228.



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FIG. 229.

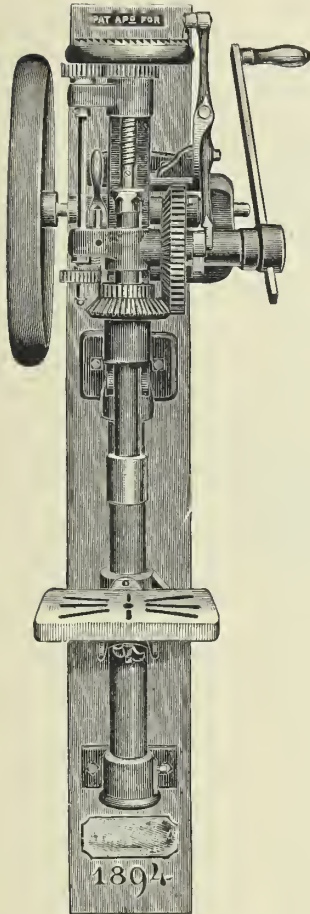


No. 4 UPRIGHT SELF FEED DRILL.

THE No. 4 DRILL, is a practical tool, designed in every respect for large and heavy work. The main driving gear is 10 inches in diameter and double-back geared, which can be changed from fast to slow speed by shifting from shaft A to shaft B (or balance wheel shaft), thus increasing the power two and one-half times for heavy work. Shaft A for lighter work and faster speed. It will drill to the center of an 18-inch circle. Spindle bored to take in $\frac{1}{2}$ -inch shank drills, unless otherwise ordered. Drills $\frac{1}{8}$ to $1\frac{1}{2}$ inch hole. Length, 50 inches. Weight complete, 200 pounds.

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FIG. 230.



IMPROVED POST DRILL,

WITH QUICK RETURN.

THIS DRILL is supplied with patent quick return attachment, by which the drill bit is removed from the work in an instant by simply pushing the lever with the left hand, while the right hand continues turning the handle or crank which raises the bit to any height desired, and at the same time cleaning the hole bored by the drill bit revolving while being raised.

It has two journal bearings for each gear, one on each side of the gear. By referring to cut of backbone of this Drill, you will at once see the valuable principal of the double journal bearings, and at the same time discover the weakness of the drills that are made with the stud simply screwed into the backbone at its weakest point.

The Drill is supplied with two true and honest speeds on the right hand side of the Drill; first speed for light and medium work and second speed for heavy work. You simply change the hub from speed first to speed second.

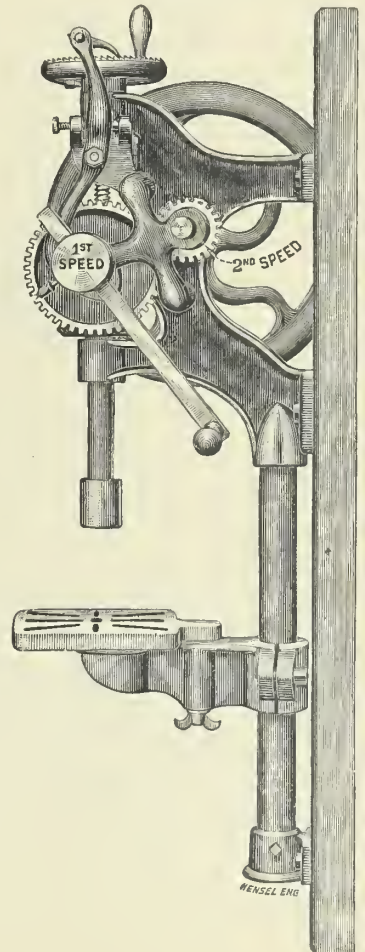
Drills to center of 15½ inches.

The spindle has a run up and down of 4½ inches and will bore from 0 to 1¼ inch hole.

Drills are all bored to take in ½ inch straight shank drills. When otherwise ordered, will be furnished for ⅝.

Weight, complete, 130 pounds.

FIG. 231



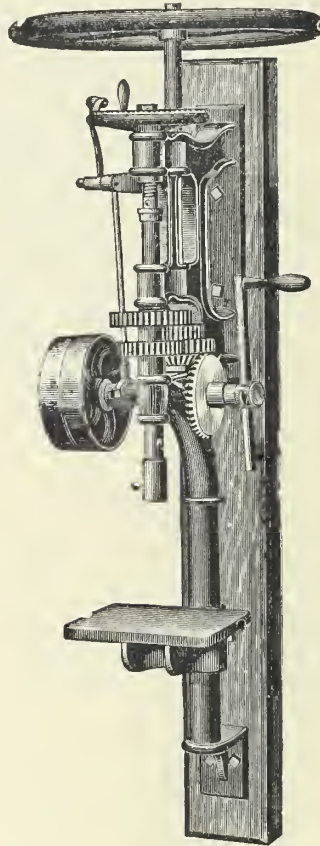
SELF FEED POST DRILL.

DRILLS to the center of a 15 inch circle, and from ¼ to 1¼ inch hole. Has double journal bearings with full back gear; also two speeds on right hand side of drill which can be changed in an instant to suit all kinds of work. Diameter of spindle, 1¼ inches. The screw has an up and down run of 4½ inches. The automatic self-feed is the latest improved. The table is large and slotted, so operator can securely bolt work on for drilling. The drill is mounted on a hard wood plank, 2 inches thick. The spindle is bored to take in ½ inch straight shank drills. If specially ordered, bored to take in ⅝ or ⅞.

Weight, complete, 125 pounds.

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FIG. 232.

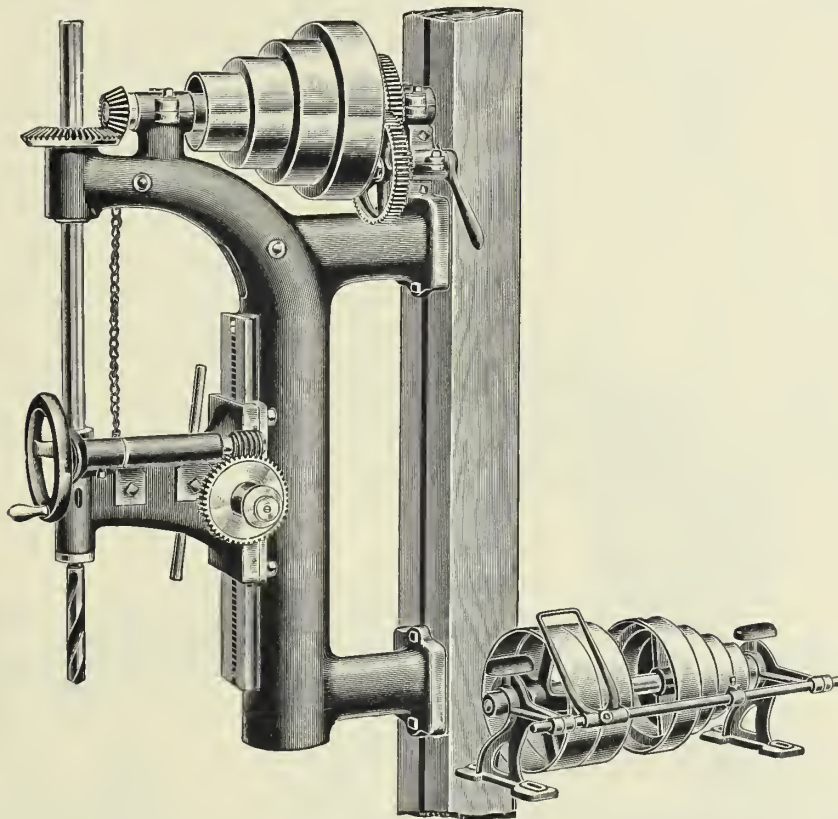


No. 7 SELF FEED DRILL.

THE above Drill has cut gears so arranged that quick or slow motion is given to spindle, as light or heavy work may require, and is a desirable tool for machine shop or factory, and is largely taking the place of higher cost machines. Drills to center of 19 inch circle; spindle takes drills $\frac{3}{4}$ inch shank; can be used as hand and power, or either independently; pulleys 10 x $2\frac{1}{2}$ inches; speed for ordinary work about 180 turns per minute; drills from 0 to $1\frac{1}{2}$ inch hole. Length, 65 inches. If specially ordered, spindle will be bored to take in $\frac{1}{2}$ inch straight shank; drills without extra charge. Weight complete, 250 pounds.

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FIG. 234.



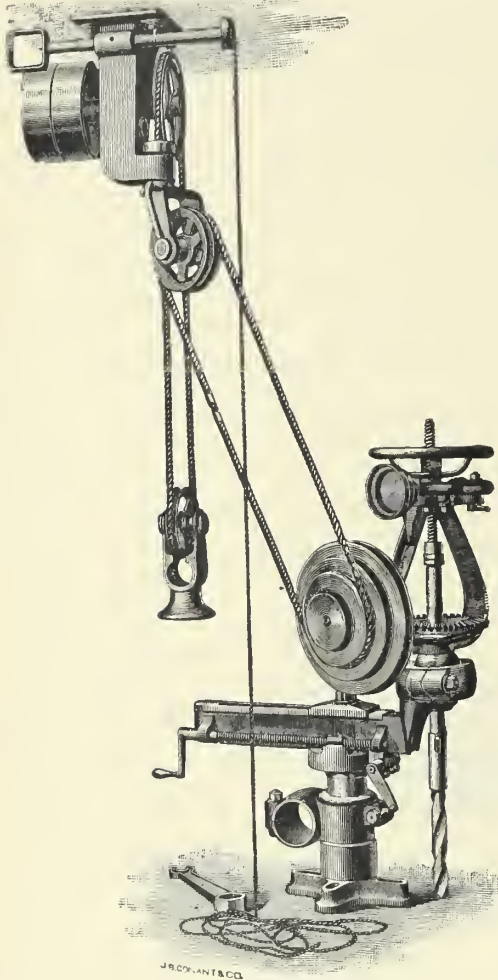
NEW 20 AND 46 INCH COMBINED BACK GEARED POST DRILL.

THE above cut represents the improved sliding head, quick return, lever or wheel feed, back geared Post Drill. The sliding head has a vertical movement of 18 inches, and can be placed at any position on face of column quickly by means of the quick return lever. From the face of column to center of the spindle is 10 inches, and from the post where drill is fastened to center of spindle is 23 inches. As will be seen, this machine will drill to the center of a circle 46 inches in diameter. It can be bolted to wall or post at any required distance from the floor, on account of which a very large range of work can be done. Diameter of spindle is $1\frac{1}{2}$ inches; hole in the same conforms to Morse taper No. 3. Cones are 5, 7, 9, and 11 inches in diameter, and with the back gears this machine will do quite heavy work. It is especially designed for carriage makers and blacksmiths.

Countershaft is furnished free of charge. Tight and loose pulleys on same are 12 x 3 inches. Total weight, about 45 pounds. This is a thoroughly made tool in every respect.

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FIG. 235.



No. 3 PORTABLE DRILL.

THIS SIZE MACHINE will drill holes up to 2 inches diameter, and is also furnished with an automatic feed.

The arm has a reach of $21\frac{1}{2}$ inches; drilling, at one setting, anywhere over a surface of 43 inches outside diameter and 13 inches inside diameter. The arm is moved in and out by a screw and rotated around the post by a worm and tangent wheel.

The spindle has 8 inches traverse, contains a No. 4 Morse taper socket, and is furnished with an automatic feed arrangement giving, per revolution of the spindle .005, .007 or .013 of an inch advance. The spindle is held in a vertical position by a squaring collar fitted to the underside of the ball on the frame. On removing this collar the spindle (by means of the ball and socket joint) can be set at any angle up to 30 degrees.

The post has 6 inches vertical adjustment to allow for the use of different lengths of drills and reducing sockets. It can be held in the split-bearing on the side of the base for drilling horizontally.

The tight and loose pulleys on the No. 2 countershaft (this being the size furnished with this machine) are 10 inches in diameter for 3-inch belt, and should make 200 revolutions per minute.

Weight of the machine, 285 pounds.

Weight complete with countershaft, boxed for shipment, 625 pounds.

PORTABLE DRILL WITH COUNTERSHAFT.

THIS MACHINE can be placed as easily as a ratchet brace, and will drill at any angle, in any position, at any distance, and in any direction from the power. Is especially adapted to drilling all pieces which are inconvenient to move, or which cannot be readily adjusted under stationary Drilling Machines.

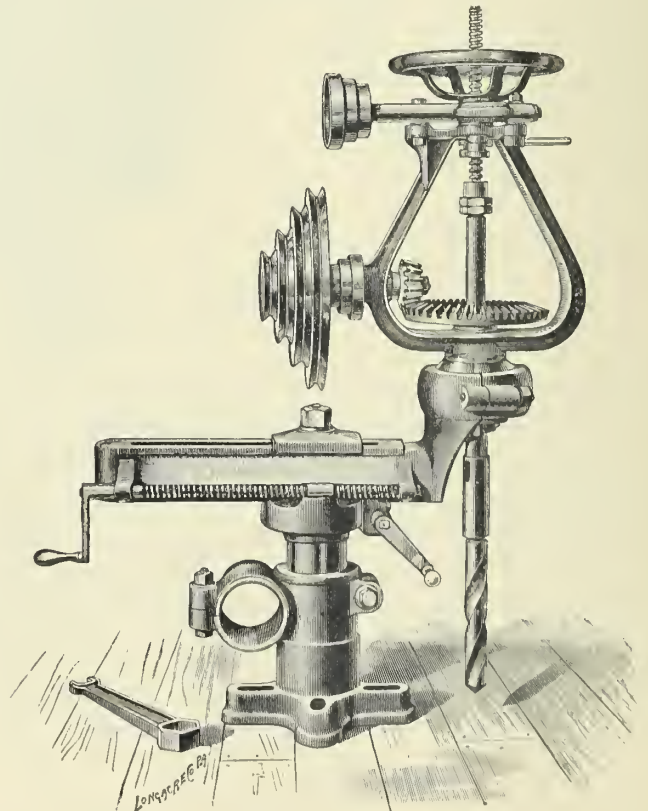
The accompanying cut represents a No. 3 Drill with countershaft, showing the manner in which the power is applied to the machine.

The countershaft being bolted to the ceiling or other convenient place, receives power from the "line-shaft" by a flat belt on the fast and loose pulleys. The frame carrying the "idlers" rotates on a hollow stand, through which the round belt passes to the grooved driving pulley. The rotation of this frame permits the belt to be led to the Drilling Machine in any direction, radially, from the countershaft, while the rise and fall of the weighted "idler" permits it to be led to any point within the scope of this rise and fall—say ten to fifteen feet or more. By inserting sections of belt by means of the hook couplings any distance can be reached.

The base of the Drilling Machine is intended to be bolted or clamped to the piece to be drilled. The height of the post can be adjusted to suit the different lengths of drills and chucks used in the spindle.

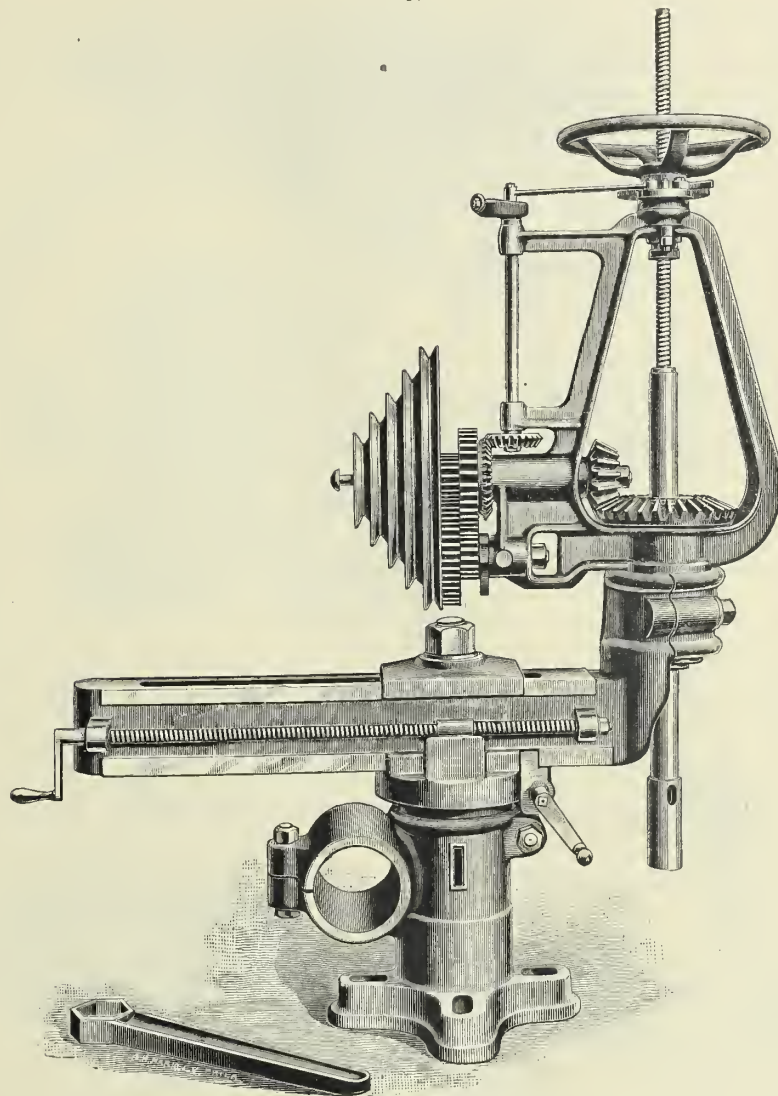
The radial arm is adjustable in direction of its length, and can be rotated about the post, thus any point within the circle having the arm for its radius can be reached without moving the machine.

FIG. 236.



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FIG. 237.



No. 5 PORTABLE DRILL.

THIS DRILL is designed for the heaviest kind of boring, having five steps on the driving cone and being powerfully back geared. The arm has a reach of 36 inches, drilling, at one setting, anywhere over a surface of 72 inches outside diameter and 22½ inches inside diameter. The arm is moved in and out by a screw and rotated around the post by a worm and tangent wheel.

The spindle has 22 inches traverse, contains a No. 5 Morse taper socket, and is furnished with an automatic feed arrangement, giving, per revolution of the spindle, any advance from .005 of an inch to .125 of an inch. As in the No. 4 Drill, the frame is held in a straight bearing, which keeps the spindle vertical.

The post has 8 inches vertical adjustment to allow for the use of different lengths of drills and reducing sockets. It can be held in the split-bearing on the side of the base when drilling horizontally.

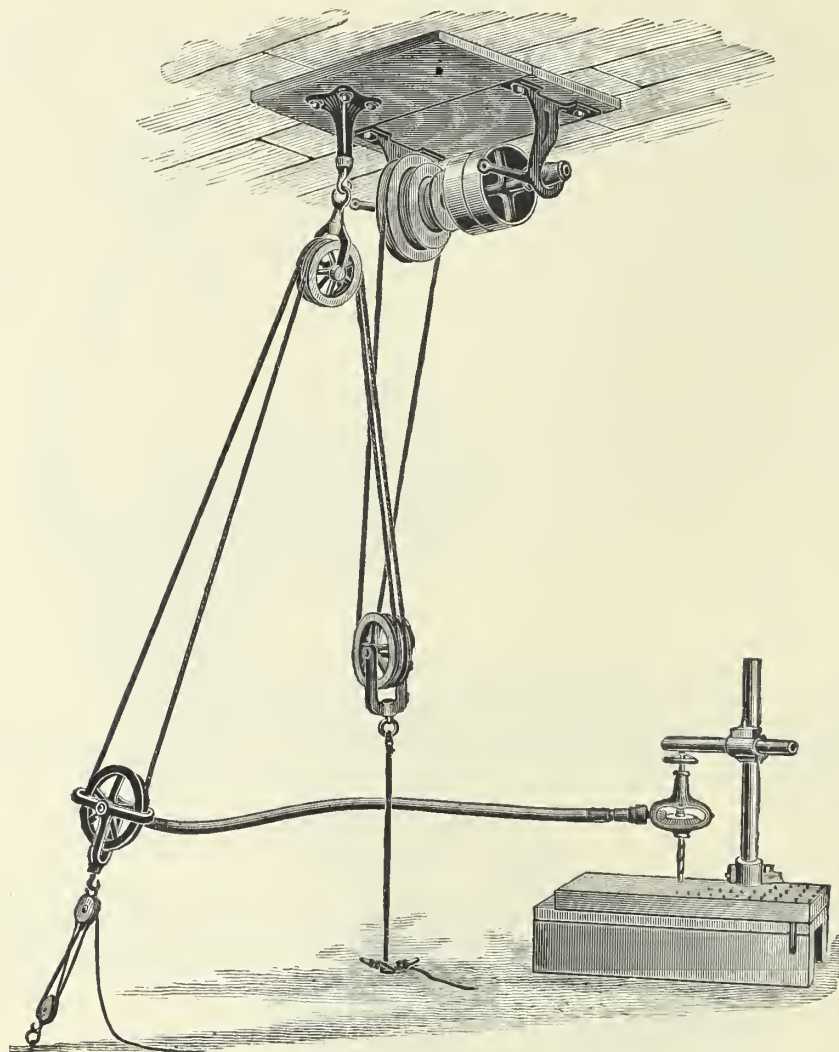
The tight and loose pulleys on the No. 3 countershaft (this being the size furnished with this machine) are 16 inches in diameter for 3½ inch belt, and should make 150 revolutions per minute.

Weight of the machine is 900 pounds.

Weight, complete with countershaft, boxed for shipment, is 1400 pounds.

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FIG. 238.



PORTABLE DRILL PLANT.

THE above cut represents full Portable Drill Plant, consisting of flexible shaft, countershaft, drill press, roundabout, etc., which will permit of a $\frac{3}{4}$ inch rope, doing more work with less tension than a 1 inch rope would do with the old style small pulleys, thus saving the wear on belt. For long distances we furnish an extra idler at small additional cost.

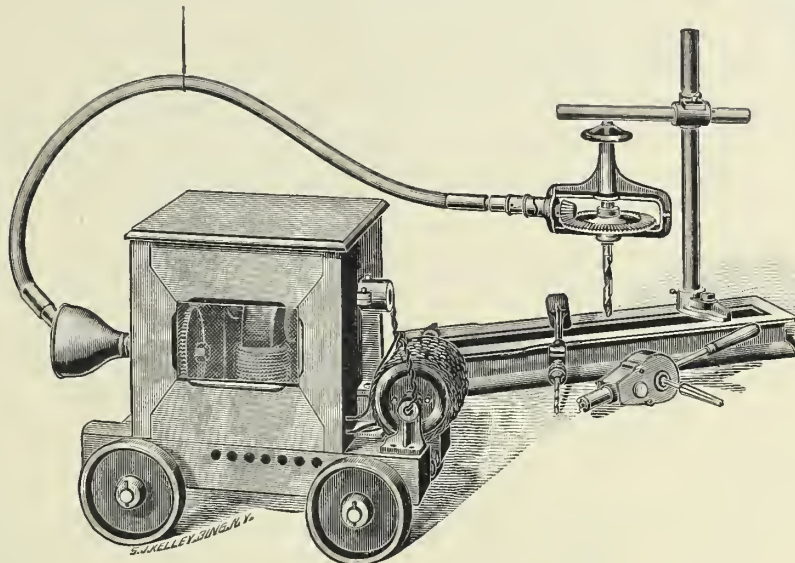
SPECIFICATIONS.

	Capacity about	Speed of Countershaft about	Shipping Weight about
No. 3, - - - - -	Drills to 1-4 inch	200	130 pounds
No. 4, - - - - -	" 1-2 "	650	140 "
No. 4, - - - - -	" 5-8 "	450	230 "
No. 5, - - - - -	" 15-16 "	450	250 "
No. 6, - - - - -	" 1 1-4 "	440	265 "
No. 8, - - - - -	" 1 5-8 "	425	310 "
No. 9, - - - - -	" 2 "	400	340 "
No. 8, - - - - -	" 2 1-2 "	425	340 "
No. 9, - - - - -	" 3 "	375	370 "

Speed of countershafts only approximated. Should be governed according to material drilled.

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FIG. 239.



COMBINATION OF STOW FLEXIBLE SHAFT AND ELECTRIC MOTOR.

AS from time to time small shops have grown larger and large shops great, a demand has been made upon us for an arrangement of our drilling, tapping and reaming plants that would make them available for a more extended range of work. This demand was partially met by increasing the length of driving rope and adding extra idlers for support of same but the objection was again urged that where traveling cranes or other overhead machinery were used, the driving rope was in the way.

The very general introduction of electricity into the larger shops has enabled us to entirely overcome this difficulty by the combination of our flexible shaft and specially designed low speed electric motor.

We have had this combination under advertisement for nearly three years, and after long continued and expensive experiments are now enabled to offer to such of the trade as have electricity in their shops or can make connection with a power current, a portable electric drilling, tapping and reaming plant which can without trouble or loss of time be conveyed to any part of the building. We also furnish it with waterproof covering, thus permitting its use for yard work in all kinds of weather.

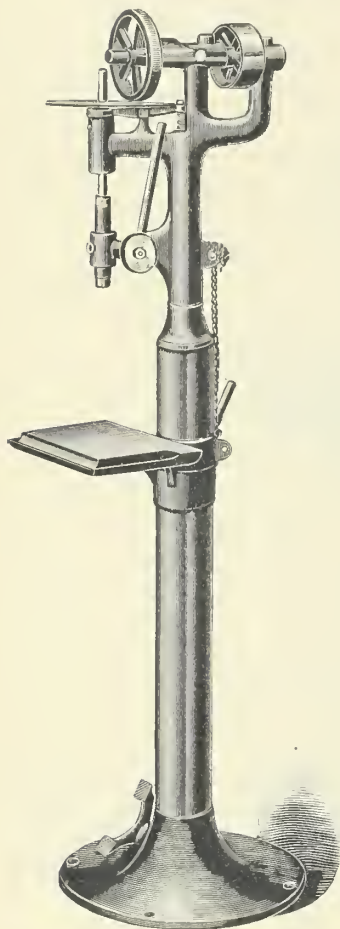
Our Motor complete includes truck, rheostat, starting and stopping box, reduction gears, reel, 100 feet insulated wire and box to cover motor.

Our Motors have a normal speed of about 800, which can be increased by rheostat to 1000 or 1200 and reduced by gears furnished to about 275 without loss of power. A higher or lower rate of speed can be obtained by the substitution of suitable gears.

Our Standard Motors we manufacture for a voltage of 110, 220 and 500, but we make them to order for any practical voltage.

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FIG. 240.



No. 1 FRICTION DRILL.

THE principal feature of this Drill is that power is greatest when speed is slow and large drills are used, and most sensitive for small drills under high speed.

The friction plate is always lowered out of contact with the pulley when not in motion, as depressions are made in the leather on pulley when left in contact for any length of time.

This tool has many valuable features, some of which we mention :

The platen is counterbalanced by a weight in column, and can be instantly raised and lowered, also can be swung to either side of column and locked.

It requires about one-third as much belting as other drills.

By a slight motion of the foot it can be quickly started and stopped.

The workmanship throughout is first-class and the material used is the best that can be obtained.

SPECIFICATIONS.

It will drill from 0 to $\frac{3}{8}$ inch.
 Greatest height from base to spindle, - - - - - $46\frac{1}{2}$ inches
 Greatest height from platen to spindle, - - - - - 35 inches
 Distance from column to spindle, - - - - - 5 inches
 Diameter of column, - - - - - $3\frac{3}{4}$ inches

Diameter of spindle, - - - - - $\frac{3}{4}$ inch
 Vertical motion of spindle, - - - - - $3\frac{1}{2}$ inches
 Size of table, - - - - - 10 x 14 inches
 Size of driving pulley, - - - - - 2 x 5 inches
 Speed of driving pulley, - - - - - 600 rev.
 Speed of drills, - - - - - 400 to 1500
 Spindle fitted for No. 1 Morse taper.

No. 2 FRICTION DRILL.

THE advantage of this Drill over all other Sensitive Drills is, the power is always in the proper relation to the size of Drill used. The resistance of the drill on the work is transmitted through the spindle to the friction plate and pulley. Thus a large drill has greater resistance than a small one, and the driving power is always in the same relation. The trouble heretofore in all Friction Sensitive Drills has been to keep the friction adjusted to the size of drill. When a small drill is used the friction must necessarily be less than when a large one is used, or the sensitive feature is lost. Any mechanic will readily see the great advantage thus obtained.

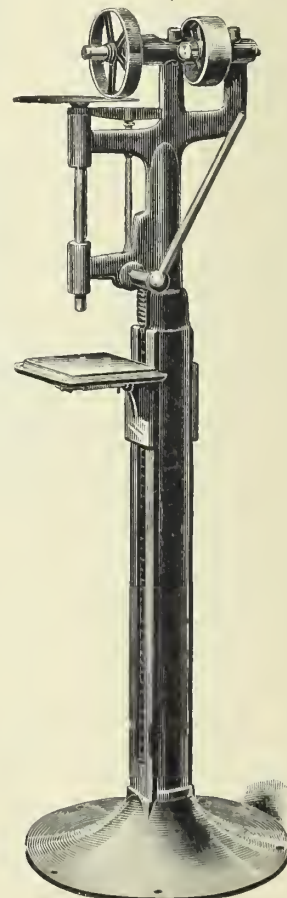
The friction plate is always lowered out of contact with the pulley when not in motion, as depressions are made in the leather on pulley when left in contact for any length of time. The pressure of the work coming against the friction plate, instead of collar, saves friction and wear. The drill also starts and stops automatically, and is always at rest when not in use.

By a slight motion of the feed or hand lever it automatically starts and stops.
 The platen can be instantly adjusted from one extreme to the other.

SPECIFICATIONS.

It will drill from 0 to $\frac{3}{8}$ inch.
 Greatest height from base to spindle, - - - - - 42 inches
 Greatest height from platen to spindle, - - - - - $32\frac{1}{2}$ inches
 Distance from column to spindle, - - - - - 5 inches
 Diameter of column, - - - - - $3\frac{3}{4}$ inches
 Diameter of spindle, - - - - - $\frac{7}{8}$ inch
 Size of table, - - - - - 9 x 11 inches
 Size of driving pulley, - - - - - 2 x 5 inches
 Speed of driving pulley, - - - - - 600 revolutions
 Speed of drills, - - - - - 400 to 1500
 Spindle fitted for No. 1 Morse taper.

FIG. 241.



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FIG. 242.



IMPROVED SENSITIVE DRILL.

THIS tool is designed for light rapid drilling up to 5-16 holes. It is the result of several years' experience with this class of drills, and it is especially adapted for the use of manufacturing jewelers, electricians, mathematical instrument makers, and for light drilling generally.

The spindle is driven by a 1 inch flat belt. It has two speeds, a cut steel rack and pinion feed, and an adjustable stop to gauge the depth of holes. It is entirely relieved of belt strain, and is counterbalanced by a weight inside of frame, making it extremely sensitive and uniform to the touch. It is also provided with means for taking up wear or lost motion, and is fitted to "Almond," "Skinner," or other standard drill chuck.

The spindle pulley is so arranged that it will not throw oil in the operator's face.

The countershaft is attached to the frame and can be placed directly under your line shaft, thus avoiding the trouble and expense of putting up a countershaft.

It can be run at a very high rate of speed, as the pulleys are turned inside and out, and all the rotary parts are perfectly balanced.

SPECIFICATIONS.

Greatest distance from spindle to table,	-	-	7½ inches
Vertical movement of spindle,	-	-	2½ inches
Vertical movement of table,	-	-	7 inches
Diameter of table,	-	-	8 inches
Distance from center of spindle to frame,	-	-	51⅞ inches
Drill capacity,	-	-	0 to ⅝ inch
Weight without column,	-	-	45 pounds
Weight with column,	-	-	110 pounds

ONE SPINDLE SPECIAL SENSITIVE DRILL.

THIS DRILL is intended for bicycle work. It is used mostly for drilling for the pins to hold the frames for brazing, or for any other drilling necessary to be done on the frames.

The work can be placed on a truck or table of the proper height.

The spindle is adjustable by moving the arm which is gibbed to the front of the upright, having a traverse of 13 inches.

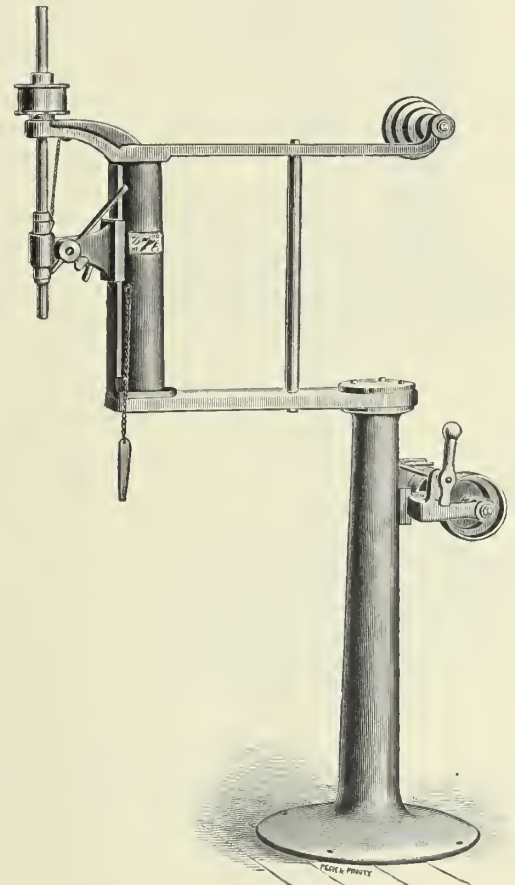
The throw of the spindle by the feed lever is 4 inches.

The distance from spindle to column is 28 inches.

The tight and loose pulleys are 4¾ x 1¾ inches. The speed should be 375 revolutions.

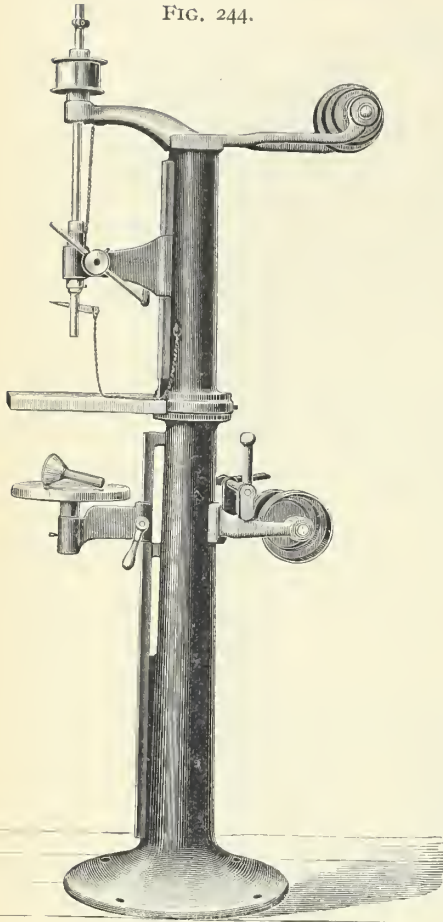
It can be run directly from the main line. Countershafts furnished when desired.

FIG. 243.



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FIG. 244.



ONE SPINDLE SENSITIVE DRILL.

THIS DRILL is intended for all kinds of accurate and light work up to $\frac{1}{2}$ inch holes. The spindle is counterbalanced by a weight, and is adjustable by moving the arm which is gibbed to the front of the upright, having a traverse of 13 inches from the upper table.

The throw of the spindle by the feed lever is $3\frac{5}{8}$ inches.

The rack for moving the spindle is steel.

The distance from the center of the spindle to the column is 6 inches.

The upper table can be turned around the column when required to use the bell center for centering work, or the lower table. The lower table is 10 inches in diameter, and moves the entire length of the column, giving a distance of 46 inches between the table and spindle.

The bell center fits into the same socket as the lower table.

The tight and loose pulleys are $4\frac{3}{4} \times 1\frac{3}{4}$ inches. The speed for general work should be 350 revolutions.

The cone has three changes of speed.

The belts are of extra length.

The lower table moving the entire length of the column is very convenient, and gives the drill the same capacity for light work as a larger tool.

The steel rack for moving the spindle, gives a full bearing on the tooth, and will not break as a cast-iron rack cut on the slide.

Weight, 250 pounds.

TWO SPINDLE SENSITIVE DRILL.

THIS DRILL is intended for light work up to $\frac{1}{2}$ inch holes. It is accurate, sensitive and strong. It has long belts, and the spindles are counterbalanced by weights.

The spindles are adjustable by moving the arms which are gibbed to the front of the uprights, having a traverse of 13 inches, and have taper holes, Morse drill socket No. 1.

Each spindle has three changes of speed independent of each other.

The throw of the spindles by the feed lever is $4\frac{1}{8}$ inches.

The distance from the center of the spindles to the column is 6 inches.

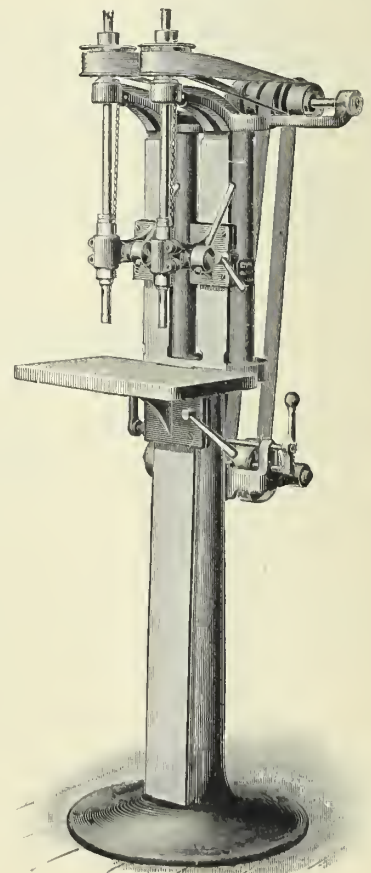
The table is 19 x 11 inches and moves the entire length of the column, giving a distance of 46 inches between the table and spindles.

It needs no countershaft, as it takes the belt direct from the main line.

The tight and loose pulleys are 6 x 2 inches.

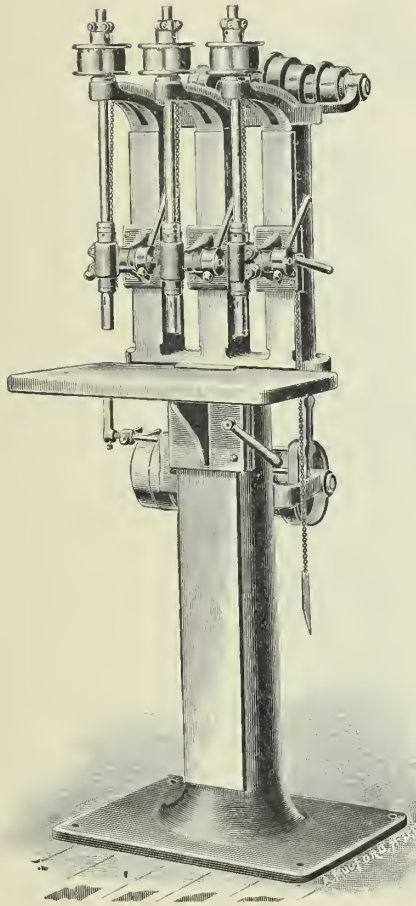
The speed for general work should be 350 revolutions. Weight, 350 pounds.

FIG. 245.



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FIG. 246.



THREE SPINDLE SENSITIVE DRILL.

THIS DRILL is intended for work up to $\frac{1}{2}$ inch holes. It is sensitive and strong. It was designed with especial reference to the use of drills or tools of different sizes and lengths, having the spindles and table adjustable, up and down. Each spindle has three changes of speed independent of each other.

The spindles are tool steel $\frac{3}{4}$ inch diameter, and have a traverse of 13 inches. They have taper holes, Morse drill socket No. 1. They are adjustable by moving the arms which are gibbed to the front of the uprights, and are balanced by weights.

The throw of the spindle by the feed level is $4\frac{1}{8}$ inches. A steel rack fitted into the slides is used.

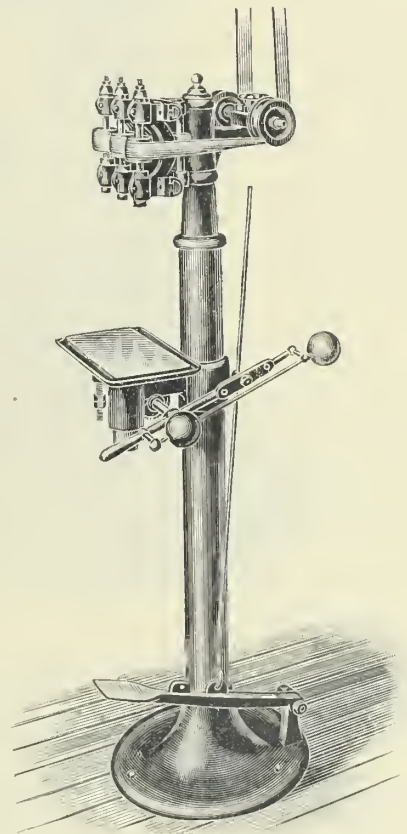
The distance from the center of spindles to the column is 7 inches.

The table is 25 x 14 inches, and moves the entire length of the column.

It needs no countershaft, as it takes the belt from the main line. The tight and loose pulleys are 8 x $2\frac{1}{4}$ inches. The cone has three changes of speed. Speed for general use, about 350 revolutions.

Weight, 500 pounds.

FIG. 247.



THREE SPINDLE SENSITIVE ADJUSTABLE DRILL No. 2.

THIS DRILL is made with automatic gravity feed and stop. The special feature is that, without changing the single belt, the spindles may be moved laterally, enabling the distance between them to vary from $2\frac{1}{4}$ inches to 5 inches. When using but two spindles they may be placed 10 inches apart.

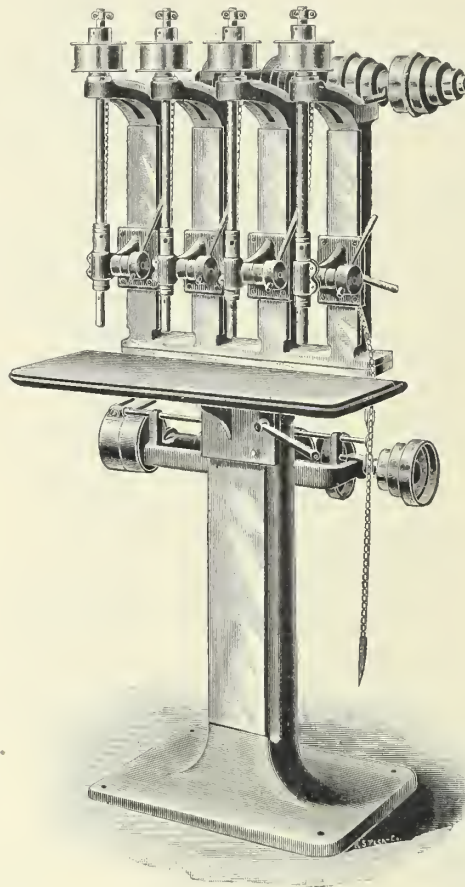
To drill from 0 to $\frac{5}{16}$ inch holes, 3 inches in depth.

Countershaft furnished with tight and loose pulley. Three changes of speed obtained with one cone.

$4\frac{3}{4}$ inches from column to spindles, and will receive work from 0 to 30 inches in height. Weight, 200 pounds.

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FIG. 248.



FOUR SPINDLE SENSITIVE DRILL.

THIS DRILL is intended for work up to $\frac{1}{2}$ inch holes. It is sensitive and strong, and was designed with especial reference to the use of Drills or tools of different sizes and lengths, having the spindles and table adjustable, up and down. Each spindle has three changes of speed independent of each other.

The spindles are tool steel $\frac{3}{4}$ -inch diameter, and have a traverse of 13 inches. They have taper holes, Morse drill socket No. 1. They are adjustable by moving the arms which are gibbed to the front of the uprights, and are balanced by weights.

The throw of the spindle by the feed lever is $4\frac{1}{8}$ inches. A steel rack fitted into the slides is used.

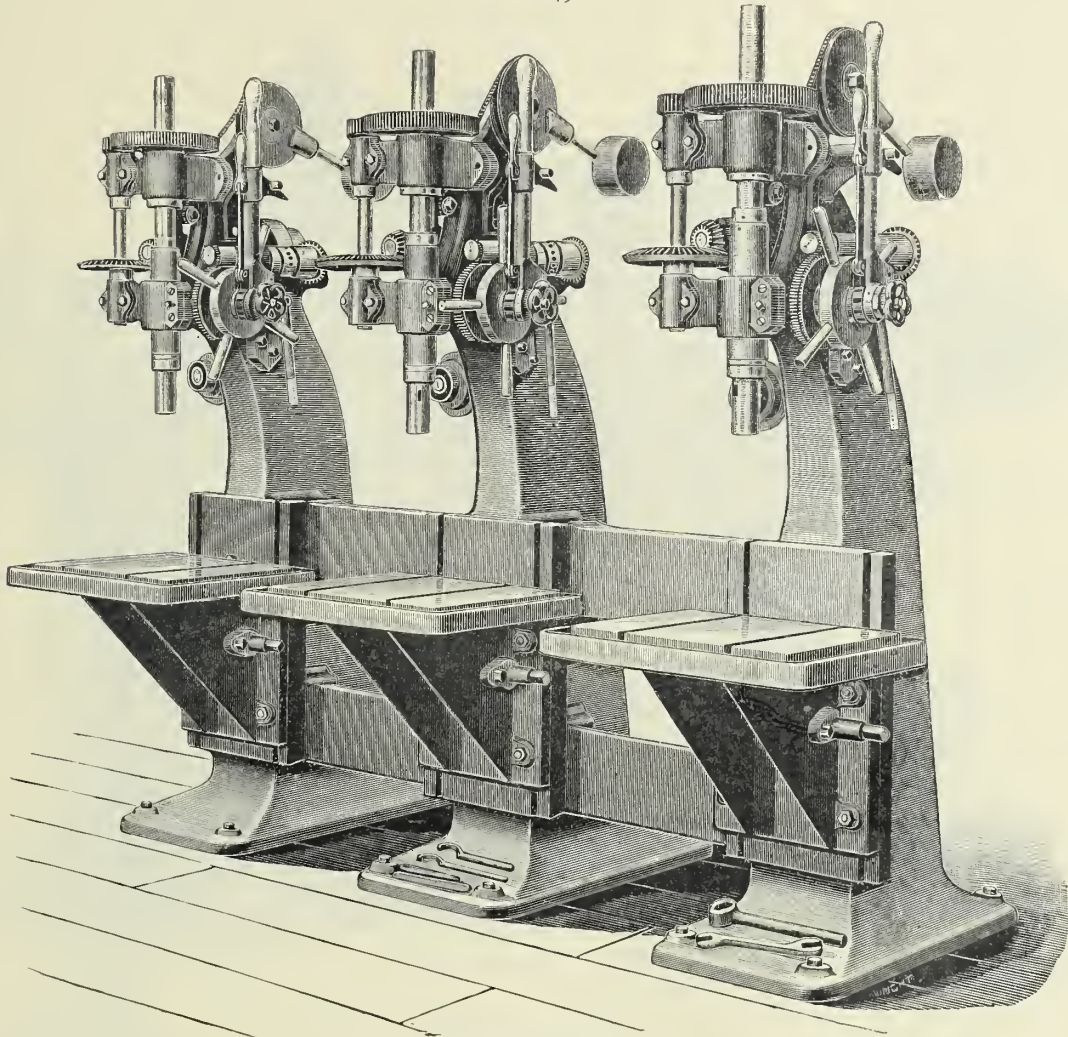
The distance from the center of spindle to column is 7 inches.

The table is 31 x 14 inches, and moves the entire length of the column.

It needs no countershaft, as it takes the belt from the main line. The tight and loose pulleys are 8 x $2\frac{3}{8}$ inches. The cone has three changes of speed. Speed for general use, about 350 revolutions. Weight, 650 pounds.

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FIG. 249.



MULTIPLE SPINDLE DRILL.

THE illustration represents the latest improved heavy multiple spindle drill press, designed especially for drilling, counterboring and reaming bicycle parts, but adapted for a great variety of other uses. Each spindle is practically a separate machine and combines the following feeds: power self feed, lever feed, automatic stop, quick return, and, if desired, hand worm feed can be added. The arrangement of parts is such that any of these feeds can be used independently of the others, and with the greatest ease on the part of the operator.

The spindles are made of steel, are two inches in diameter, and have ball thrust bearings on sleeve. They are counterbalanced by means of weights, shown on tops of frames. The automatic stop can be set to throw the feeding mechanism out of gear at any desired point. The stop is positive and cannot slip. The tables are of the bracket form, and are very massive. They have an upright bearing on main frame nineteen inches by sixteen in width, and are clamped to same in any desired position by means of four heavy bolts.

The tables are raised and lowered by means of a lever operating a shaft with a pinion which engages with a rack on face of main frame. A ratchet and pawl lock the pinion shaft so the table cannot fall.

The vertical slots in which the heads of the four supporting bolts travel are planed, insuring an accurate fit of the bolt heads and allowing them to travel easily up and down. With this construction of table all spring of same is done entirely away with and perfect work insured.

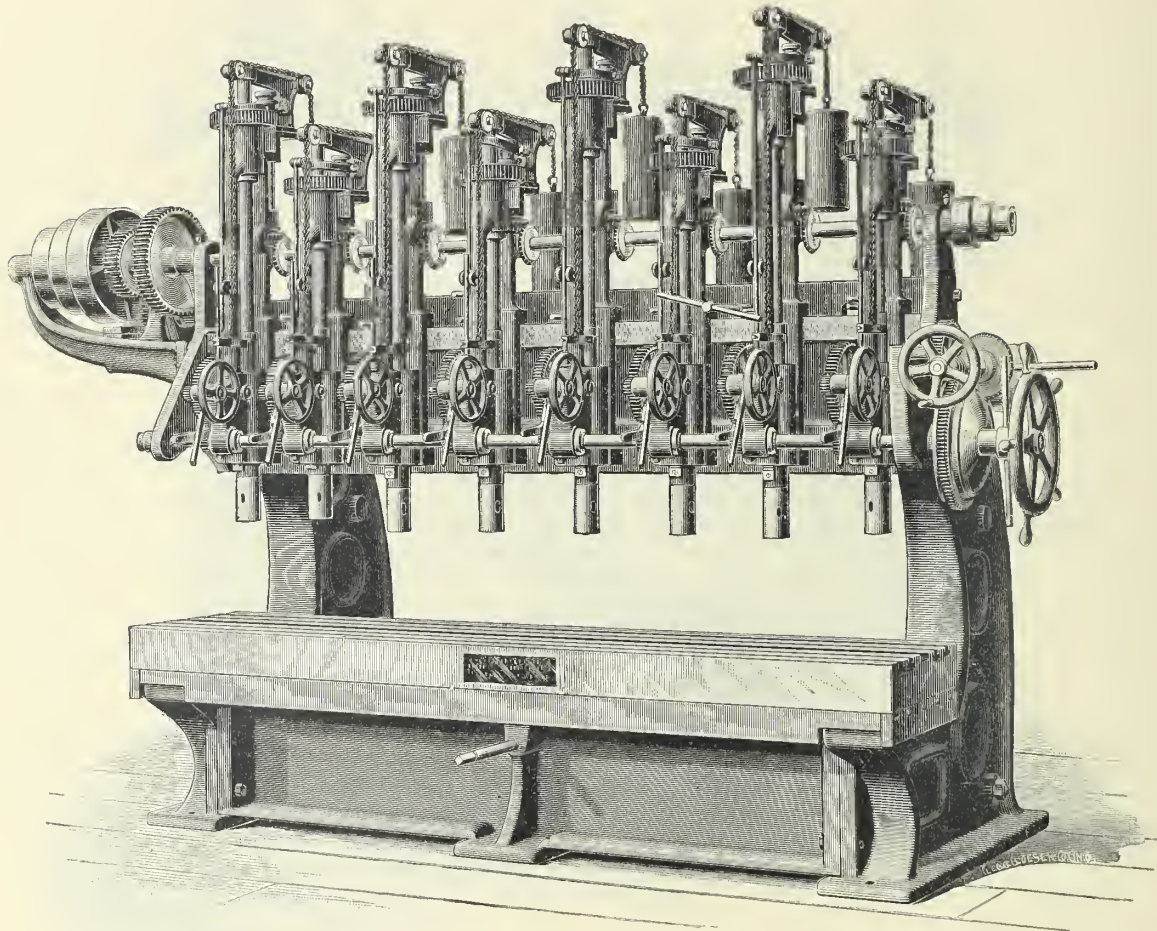
This machine will drill holes in solid steel two inches in diameter, and with its massive construction a very rapid feed is possible. Although the cut represents a three spindle machine, any number from one to four can be built.

SPECIFICATIONS.

Greatest distance from lower end of spindle in its highest position to table, - - -	22 inches	Width of table, not including oil groove, -	17 inches
Vertical adjustment of table, - - -	10 inches	Perpendicular bearing of table bracket on frame, -	19 inches
Length of table, not including oil groove, -	20 inches	Perpendicular travel of spindle, - - -	8 inches
		Weight of three spindle machine, - - -	5000 pounds

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FIG. 250.



EIGHT SPINDLE MULTIPLE DRILL.

THE construction of Multiple Drills is always subject to the class of work on which the drills are to be used; consequently no fixed standard of these machines can be adopted, but each machine must be made to suit the requirements of the work.

The cut illustrates an extra heavy and powerful eight spindle Drill, which is capable of drilling two-inch holes through ten inches of wrought iron or steel plates, and is therefore especially serviceable in marine, locomotive, car, boiler, and safe works, for any work requiring a number of holes at fixed distances apart. The heads are moved on the rail by rack and pinion, the minimum distance between centers of spindles being six inches. The two tables which are strongly supported by a heavy I shaped beam are moveable in the lateral and longitudinal directions, and can be set by means of screws and wheels and graduated discs exactly to hundredths or sixty-fourths of an inch, thus allowing holes to be drilled at any desired distance from center to center. The spindles have vertical adjustment, quick approach and return movements, and automatic stops either simultaneously or independent. The driving gears on horizontal and vertical back shafts, likewise the spindles, are made of steel. The spindle gears, apart from the minimum distance of spindles, are of very large diameter. The ratio of driving pinion and spindle gear is very near one to three. As stated above, the spindles have a minimum distance of six inches, but the spindle gear is about ten inches diameter, which is effected by having the heads of different lengths. This machine weighs 18000 pounds and is guaranteed in every detail.

In making inquiries about Multiple Drills, always send full details of the work to be done.

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FIG. 251.

FOUR SPINDLE SENSITIVE FRICTION TURRET DRILL.

THIS DRILL is of an entirely new design, combining many features of particular interest.

It is made with either four drilling spindles, or with three drilling spindles and one automatic tapping spindle.

The head carrying the spindles revolves on the column, bringing any spindle, with its tool, over the table, and in operation.

A spring stop, operated by the foot, releases or sets the head.

The top drive is set eccentric to the column, so that the spindle which is brought to the front is the only one in operation.

The speed of any spindle can be changed instantly by the pedals at the front while the machine is running.

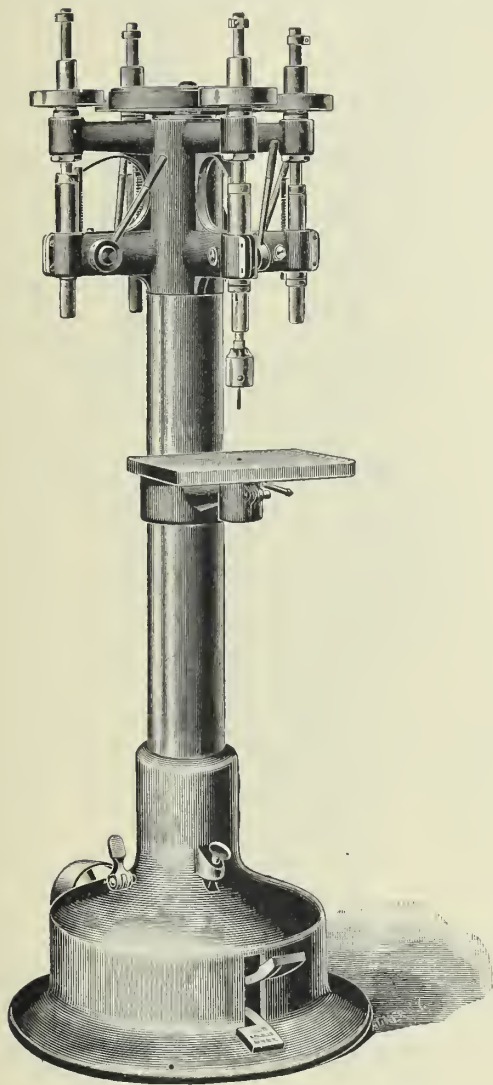
By throwing the head off the centers, all the spindles are entirely free and inoperative, although the machine is running.

The main shaft is arranged with a ball thrust bearing, and a Universal joint; all frictions are adjustable; spindle springs are on the outside, and tension is equalized.

Special attention is asked to the addition of the Automatic Tapping Spindle. By this arrangement the machine has three drilling spindles and one automatic tapping spindle always ready for use, but none in operation except the one thrown to the front; and can be used instantly as a drill, as a tapping machine, or as a combination for drilling, counterboring, and tapping of work at one setting.

The machine drills up to $\frac{1}{2}$ inch, has four inch throw of spindle, 12 inch swing of table, and 28 inch vertical movement.

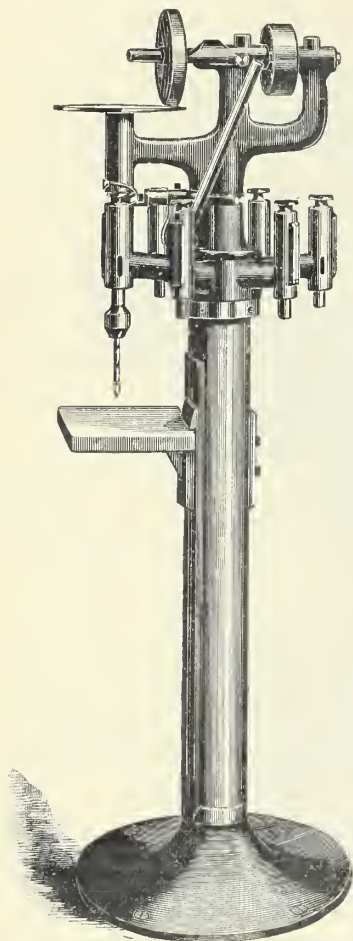
Furnished with self-oiling countershaft; or, on order, with new friction and self-oiling friction countershaft.



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FIG. 252.

SIX SPINDLE FRICTION TURRET DRILL.



THIS DRILL has many advantages over any machine of the kind yet offered. One of the principal features of this Drill is, that power is greatest when speed is slow and large drills are used, and most sensitive for small drills under high speed—a very valuable feature never before obtained in a sensitive drill.

Another great advantage over all other sensitive drills is, the power is always in the proper relation to the size of drill used. The resistance of the drill on the work is transmitted through the spindle to the friction plate and pulley. Thus a large drill has greater resistance than a small one, and the driving power is always in the same relation. The trouble heretofore in all Friction Sensitive Drills has been to keep the friction adjusted to the size of drill. When a small drill is used the friction must necessarily be less than when a large one is used, or the sensitive feature is lost. Any mechanic will readily see the great advantage thus obtained. This feature thus makes the Friction Turret Drill an unqualified success, and enables it to take in a much larger range of work than was ever supposed to be possible.

The friction plate is always lowered out of contact with the pulley when not in motion, as depressions are made in the leather on pulley when left in contact for any length of time. The pressure of the work coming against the friction plate, instead of collar, saves friction and wear. The drill also starts and stops automatically, and is always at rest when not in use.

This tool is so very simple that it is only necessary to refer to the cut to fully understand it.

By a slight motion of the feed or hand lever it automatically starts and stops.

It requires about one-third as much belting as other drills.

The platen can be instantly adjusted from one extreme to the other.

The workmanship throughout is first-class, and the material used is the best that can be obtained.

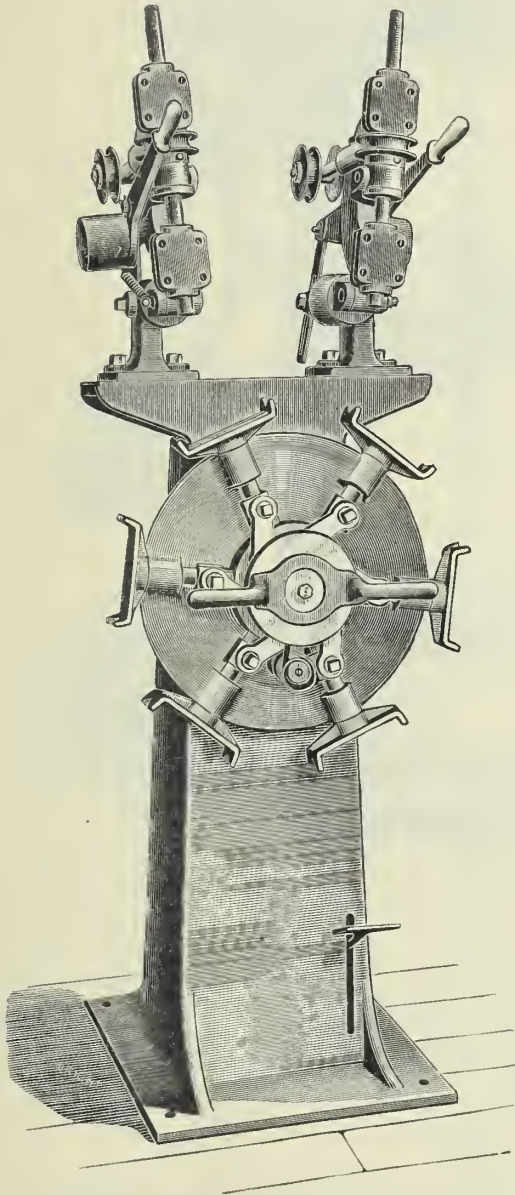
SPECIFICATIONS.

It will drill from 0 to $\frac{3}{8}$ inches.

Greatest height from base to spindle,	-	-	-	-	-	42 inches
Greatest height from platen to spindle,	-	-	-	-	-	32 $\frac{1}{2}$ inches
Distance from column to spindle,	-	-	-	-	-	5 inches
Diameter of column,	-	-	-	-	-	3 $\frac{3}{4}$ inches
Diameter of spindle,	-	-	-	-	-	$\frac{7}{8}$ inch
Size of table,	-	-	-	-	-	9 x 11 inches
Size of driving pulley,	-	-	-	-	-	2 x 5 inches
Speed of driving pulley,	-	-	-	-	-	600 revolutions
Speed of drills,	-	-	-	-	-	400 to 1500 revolutions
Spindle fitted for No. 1 Morse taper.						

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FIG. 253.



TWIN RIM DRILLING MACHINE.

FOR BICYCLE RIMS.

THE DRILL, as represented, is intended for drilling and counter-boring the nipple or spoke holes of bicycle wheel rims.

The rim is firmly held on an expanding chuck, which supports it at twelve points. The jaws are operated by means of a center disc, provided with handles and connecting links, attached in such a way to them that they can be quickly adjusted for different size wheels by means of graduation.

The shaft, carrying the chuck, has attached to it a removable index plate on its rear end. It can be exchanged instantaneously. It is operated by means of a treadle, it being locked firmly while the drilling is being done. Any desired number of holes can be drilled by changing the index plate.

The drill spindles are adjustable in all directions to accommodate any kind of wheel, whether straight or tangent spoke. The drill spindles are adjusted vertically for different diameters of wheels.

The machine is indispensable for wooden rims. The holes being drilled in the proper direction and correctly spaced, adds to the strength and appearance of the wheel.

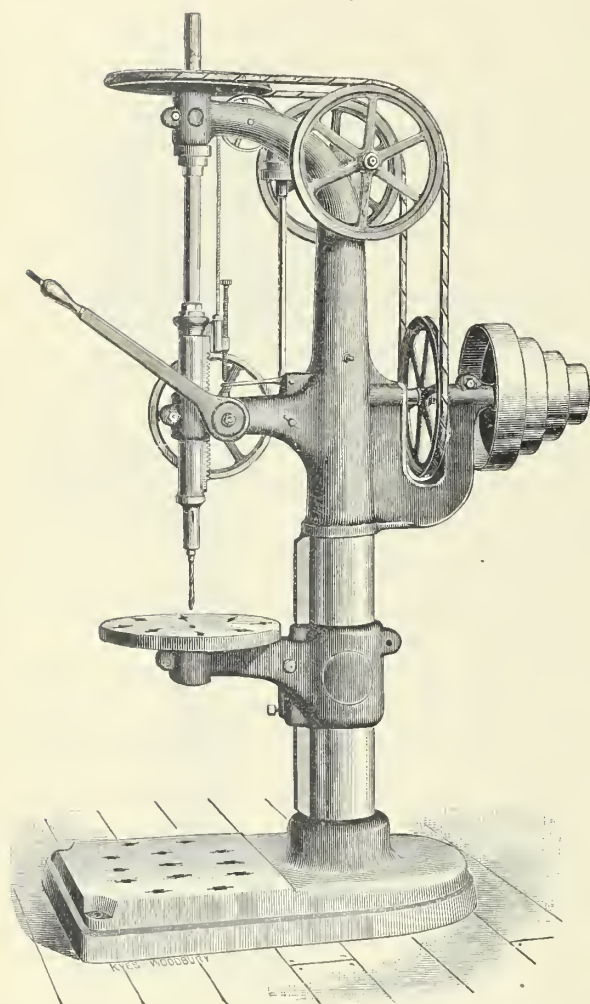
Regularly built, the machine will take in wheels 26 inches and 28 inches diameter with allowance for different diameters of tires.

One index plate and countershaft is furnished.

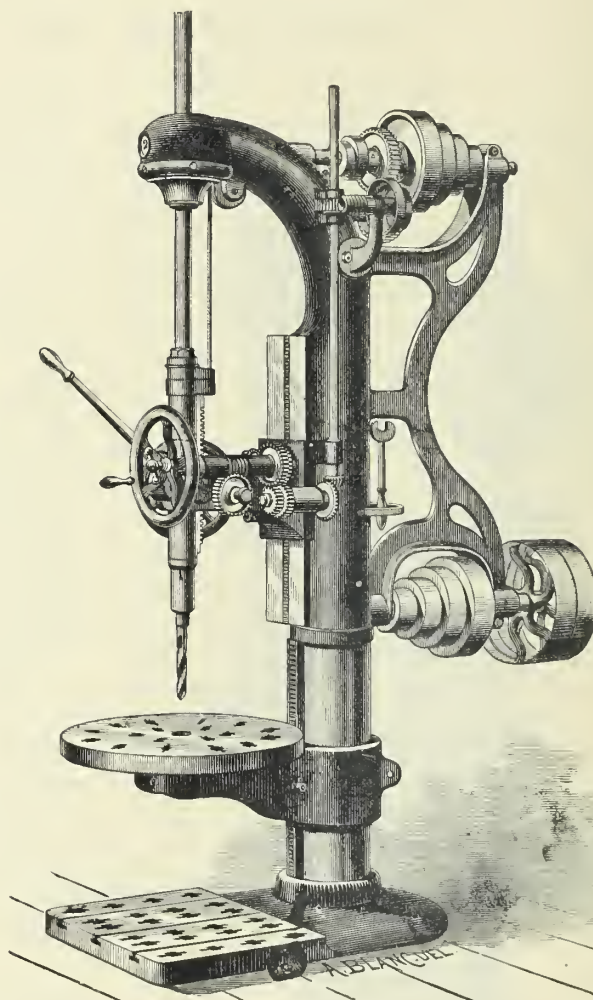
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FIG. 254.

FIG. 254 A.



No. 1 GOOSENECK BELT DRILL, 18-INCH TABLE.



No. 2 GOOSENECK BELT DRILL, DOUBLE GEARED, 22-INCH TABLE.

No. 1 GOOSENECK BELT DRILL,
18-INCH TABLE.

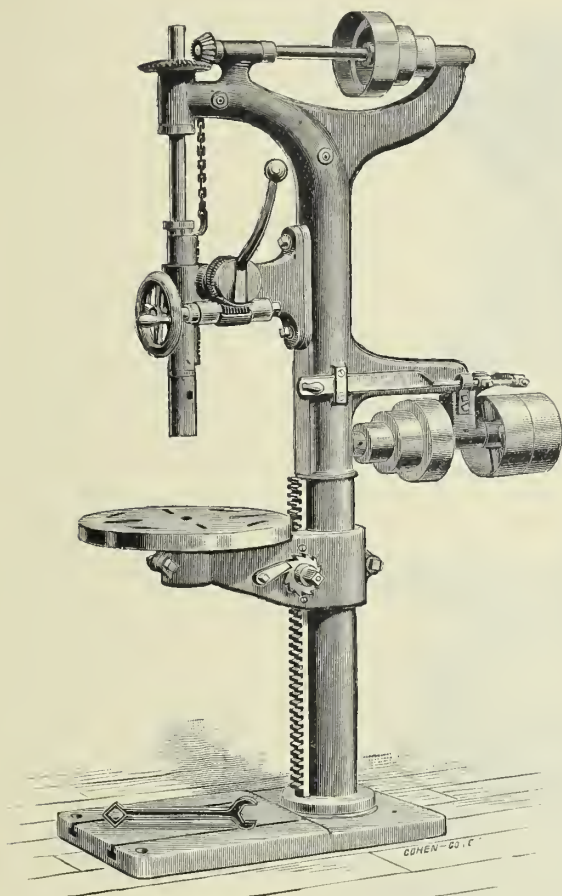
HAS a drilling capacity from $\frac{1}{8}$ to 1 inch diameter. Will receive work 20 inches in height on drilling table, and 30 inches on base plate; admits 9 inches between center of spindle and face of rack, or will drill to the center of 19½-inch circle on base. Drilling table has a vertical run of 18 inches on column. Spindle has a working range of 8 inches. Weight, 1000 pounds. Tight and loose pulleys on countershaft are 8 inches diameter, 3¾-inch face. Countershaft for steel exclusively should make 170 revolutions per minute. Countershaft for general use should make 175 revolutions per minute. Countershaft for brass and soft metals should make 180 revolutions per minute.

No. 2 GOOSENECK BELT DRILL,
DOUBLE GEARED, 22-INCH TABLE.

HAS a drilling capacity from $\frac{1}{4}$ to 2 inches diameter. Will receive work 20¾ inches in height on table, and 36 inches on base plate; admits 12 inches between center of spindle and face of column, or will drill to the center of a 25-inch circle on base. Drilling table has a vertical run of 17 inches on column. Spindle has a working range of 10 inches. Weight, 1600 pounds. Tight and loose pulleys on countershaft are 10 inches diameter, 4½-inch face. Countershaft for steel exclusively should make 130 revolutions per minute. Countershaft for general use should make 140 revolutions per minute.

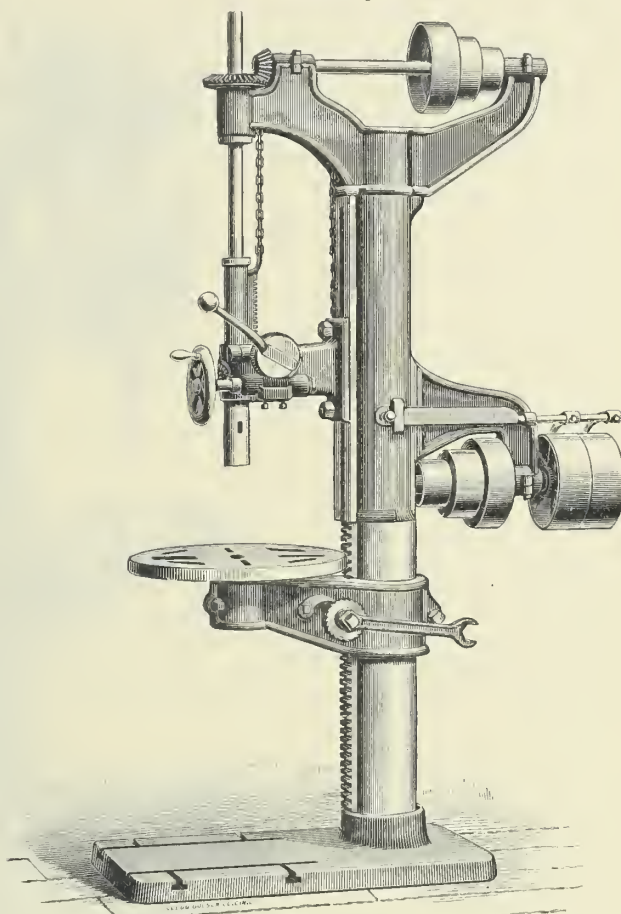
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FIG. 255.



20 INCH UPRIGHT DRILL, STATIONARY HEAD, WHEEL-FEED, AND PATENT QUICK RETURN.

FIG. 256.



20 INCH UPRIGHT DRILL, SLIDING HEAD, WHEEL-FEED AND QUICK RETURN.

20 INCH UPRIGHT DRILL.

STATIONARY HEAD, WHEEL-FEED, QUICK RETURN.

COLUMN is 5 inches in diameter, 6 feet 2 inches high; drills to the center of 20 inches diameter. The table is 18 inches in diameter. The distance from table to end of spindle is 30 inches; from base to end of spindle is 42 inches. The spindle is $1\frac{5}{8}$ inches in diameter, bored to fit No. 3 Morse taper. Bevel gear is 6 inches in diameter. Pinion runs two to one. Cone pulleys, three changes, 4, 6, 8 inches in diameter. Tight and loose pulleys, 8 inches in diameter, all for $2\frac{1}{4}$ inch belt, and should run 300 revolutions. Weight, 600 pounds.

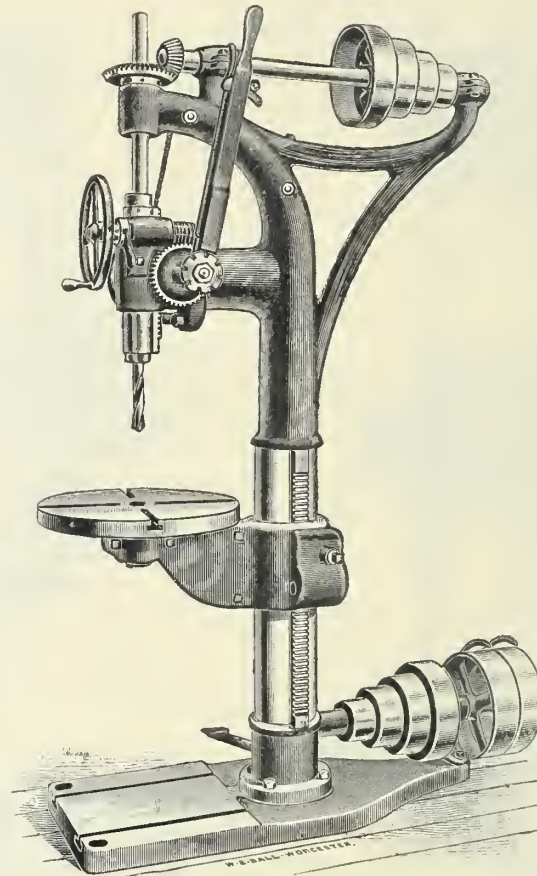
20 INCH UPRIGHT DRILL.

SLIDING HEAD, WHEEL-FEED, QUICK RETURN.

COLUMN is 6 inches in diameter, $6\frac{1}{2}$ feet high; drills to the center of 20 inches in diameter. The table is 20 inches in diameter. The distance from table to end of spindle is 32 inches; from base to end of spindle is 44 inches. The spindle is $1\frac{5}{8}$ inches in diameter, bored to fit No. 3 Morse taper. Bevel gear is 6 inches in diameter. Pinion runs two to one. Cone pulleys, three changes, $4\frac{1}{2}$, $6\frac{1}{2}$, $8\frac{1}{2}$ inches in diameter. Tight and loose pulleys are 9 inches in diameter, all for $2\frac{1}{2}$ inch belt, and should run 275 revolutions. Weight, 1000 pounds.

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FIG. 257.



20 INCH SNYDER UPRIGHT COMBINED WHEEL AND LEVER FEED.

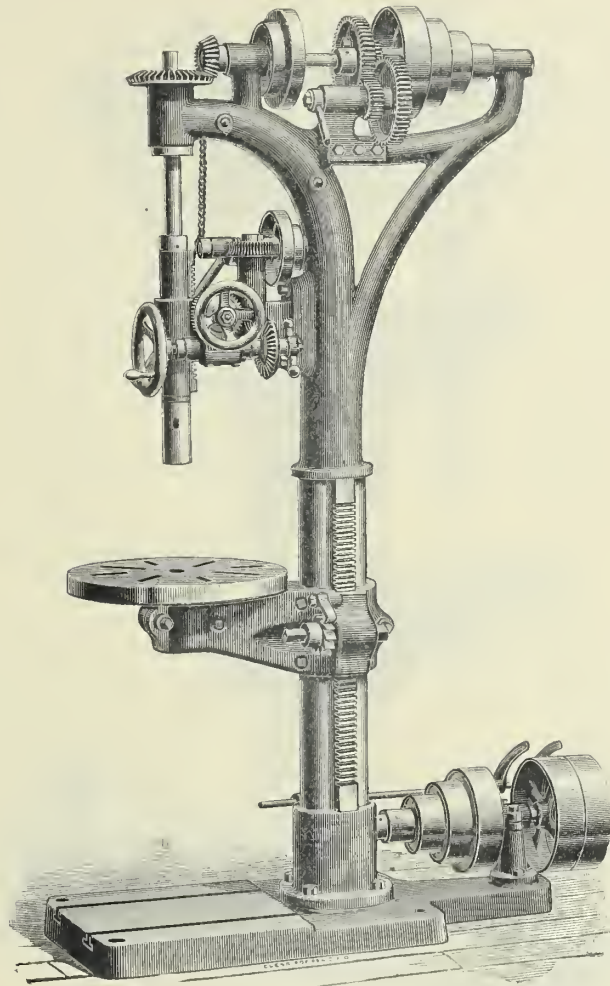
THIS DRILL has both wheel and lever feed, and is capable of doing quite heavy work. The table is vertically adjusted on the column by means of a crank in connection with worm and worm gear, which is preferable to a screw, as the table can be swung entirely around the column. The spindle is operated by a worm and worm gear, in connection with a steel rack and pinion, and has the quick return movement common to all drills of this class. It is designed to meet the requirements for an all-around tool for light or medium class work, and is very convenient to handle. A countershaft with friction pulleys can be furnished when desired for tapping purposes.

SPECIFICATIONS.

Distance from post to center of table,	-	-	-	-	-	10 $\frac{1}{4}$ inches
Diameter of table,	-	-	-	-	-	16 $\frac{1}{2}$ inches
Vertical traverse of table,	-	-	-	-	-	16 inches
Vertical traverse of spindle,	-	-	-	-	-	8 $\frac{1}{2}$ inches
Greatest distance from spindle to base,	-	-	-	-	-	42 inches
Greatest distance from spindle to table,	-	-	-	-	-	26 inches
Diameter of spindle,	-	-	-	-	-	1 $\frac{1}{2}$ inches
Hole in spindle conforms to Morse taper No. 3.	-	-	-	-	-	
Driving pulleys are	-	-	-	-	-	10 x 2 $\frac{1}{2}$ inches
Cone pulleys carry	-	-	-	-	-	2 $\frac{1}{4}$ inch belt
Speed of lower shaft for ordinary work,	-	-	-	-	-	275 revolutions
Floor space required,	-	-	-	-	-	48 x 16 inches
Total height of machine,	-	-	-	-	-	68 inches
Total weight,	-	-	-	-	-	650 pounds

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FIG. 258.



21 INCH UPRIGHT DRILL.

BACK GEARS, STATIONARY HEAD, POWER FEED, AND QUICK RETURN.

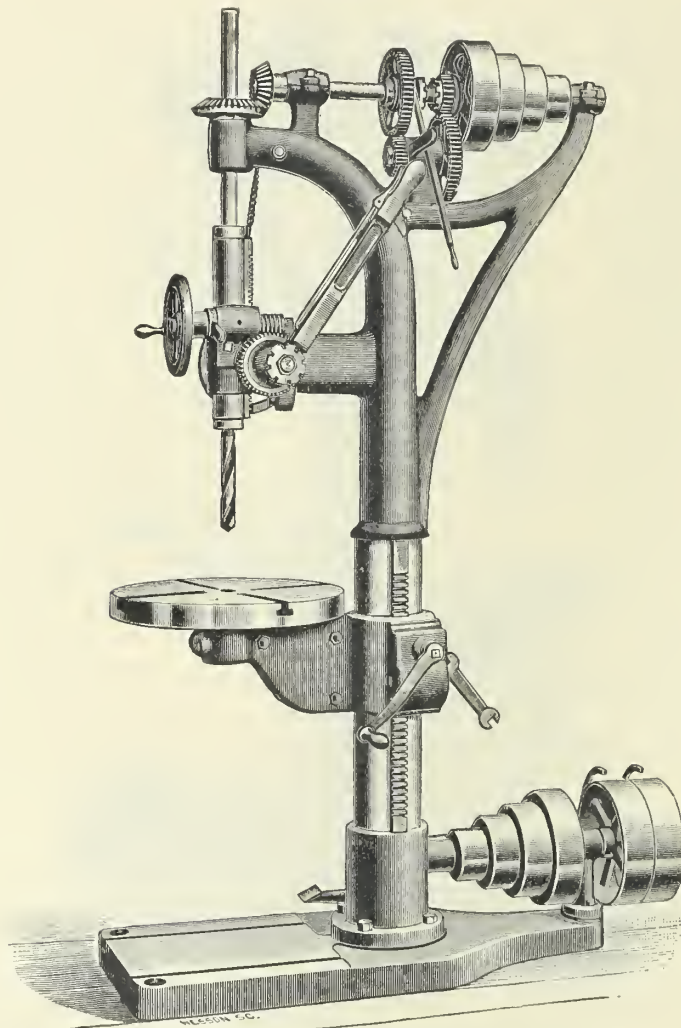
THIS DRILL has back gears and power feed, with quick return motion to the spindle. Great care has been taken to so proportion the different parts that all will correspond to one another to secure strength and solidity, and be of easy and accurate operation. The spindle and shafts are made of steel. All gears and racks are cut from the solid. The spindle is balanced by weight in column. This drill can be made with back gears only, if desired.

SPECIFICATIONS.

Swing, - - - - -	21 inches	Width of belt on cones, - - - - -	2 inches
Height of drill, - - - - -	6 feet 3 inches	Largest sizes of cone, - - - - -	9 inches
Diameter of column, - - - - -	5½ inches	Greatest distance from spindle to base plate, - - - - -	42 inches
Diameter of steel spindle, - - - - -	1⅝ inches	Greatest distance from table to spindle, - - - - -	27 inches
Diameter of table, - - - - -	18 inches	Hole in spindle to fit Morse taper, - - - - -	No. 3
Diameter of driving pulley, - - - - -	9 inches	Speed of lower shaft, - - - - -	270 revolutions
Width of belt on driving pulley, - - - - -	2 inches	Weight, complete, - - - - -	700 pounds

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FIG. 259.



21-INCH SWING SNYDER UPRIGHT DRILL,

STATIONARY HEAD WHEEL AND LEVER FEED, WITH OR WITHOUT BACKGEARS.

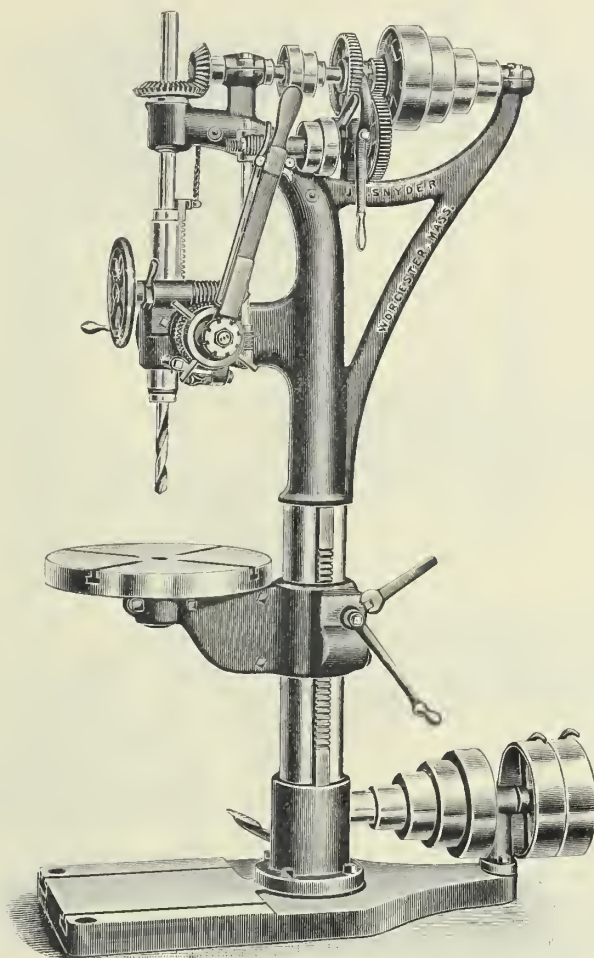
THIS DRILL has both wheel and lever feed, and is made with or without the back gears. It is powerfully geared, and is capable of doing quite heavy work. The table is vertically adjusted on the column by means of a crank in connection with worm and worm gear, which is preferable to a screw, as the table can be swung entirely around the column. The spindle is operated by a worm and worm gear, in connection with a steel rack and pinion, and has the quick return movement common to all drills of this class. The back gearing can be quickly connected or disconnected by means of a lever descending parallel with the column. This machine is designed to meet the requirements for an all around tool for light or medium class work, and is very convenient to handle. A countershaft with friction pulleys can be furnished, when desired, for tapping purposes.

SPECIFICATIONS.

Diameter of spindle, $1\frac{1}{2}$ inches. Vertical traverse of spindle, 10 inches. Diameter of table, $18\frac{1}{2}$ inches. Vertical traverse of table, $15\frac{1}{2}$ inches. Distance from post to center of spindle, $10\frac{5}{8}$ inches. Greatest distance from spindle to base, $43\frac{1}{2}$ inches; from spindle to table, 25 inches. Driving pulleys are $10 \times 2\frac{1}{2}$ inches. Width of belt on cones, $2\frac{1}{4}$ inches. Speed of lower shaft for ordinary work, 275 revolutions. Floor space required, 52×22 inches. Total height, 78 inches. Weight, 800 pounds. Hole in spindle conforms to Morse taper No. 3.

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FIG. 260.



21-INCH SWING SNYDER UPRIGHT DRILL,

WITH BACK GEARS, POWER FEED, AUTOMATIC STOP WHEEL AND LEVER FEED COMBINED.

THIS DRILL is furnished with back gears, power feed, quick return, and automatic stop for determining the depth of holes. Has wheel and lever feed combined. It is powerfully geared, and is capable of doing quite heavy work. The table is vertically adjusted on the column by means of a crank in connection with worm and worm gear, which is preferable to a screw, as the table can be swung entirely around the column. The spindle is operated by a worm and worm gear, in connection with a steel rack and pinion, and has a quick return movement common to all drills of this class. The back gearing can be quickly connected or disconnected by means of the lever descending parallel with the column. It is designed to meet the requirements for an all around tool for light or medium class work, and is very convenient to handle. A countershaft with friction pulleys can be furnished when desired for tapping purposes.

SPECIFICATIONS.

Diameter of spindle, $1\frac{1}{2}$ inches. Vertical traverse of spindle, 10 inches. Diameter of table, $18\frac{1}{2}$ inches. Vertical traverse of table, $15\frac{1}{2}$ inches. Distance from post to center of spindle, $10\frac{3}{8}$ inches. Greatest distance from spindle to base, $43\frac{1}{2}$ inches; from spindle to table, 25 inches. Hole in spindle conforms to Morse taper No 3. Driving pulleys are $10 \times 2\frac{1}{2}$ inches. Width of belt on cones, $2\frac{1}{4}$ inches. Speed of lower shaft for ordinary work, 275 revolutions. Floor space required, 52×22 inches. Total height, 78 inches. Weight, 800 pounds.

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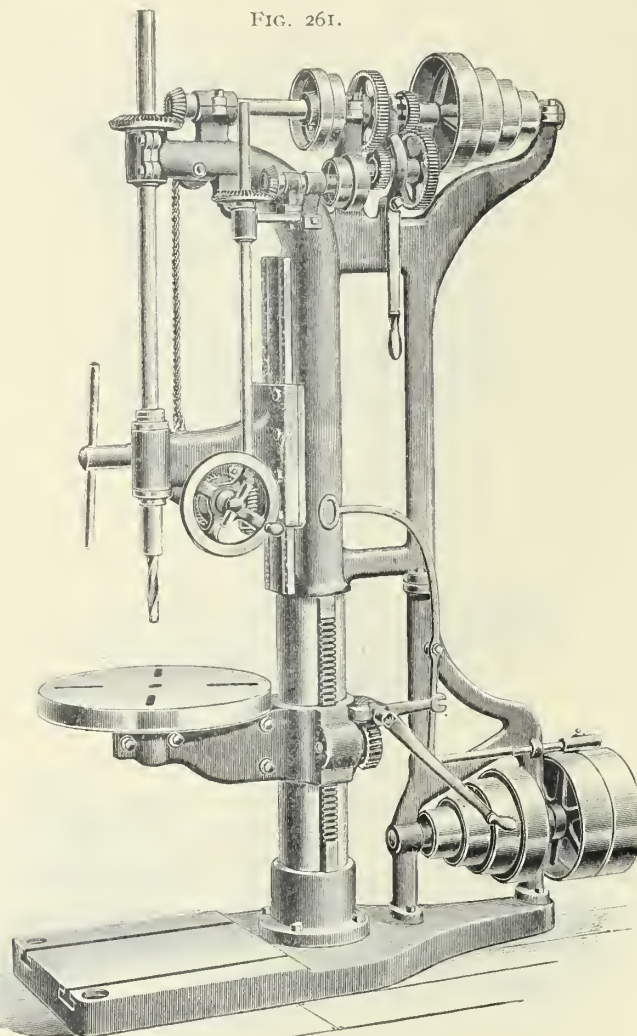


FIG. 261.

22 INCH SWING SNYDER UPRIGHT DRILL,

BACK GEARED, AUTOMATIC FEED.

THIS DRILL is furnished with back gears, automatic power feed, and our celebrated quick return to the head and spindle. The spindle has an automatic feed of 22 inches, which is an important feature when boring long holes. By the use of the quick return lever in front, in connection with rack and pinion gear, the head can be placed in any position on the face of column quickly, without stopping to unfasten the same, as is the case with other drills. The head being 12 inches long, with a bearing the entire length, and firmly gibbed to the column, there is very little spring to the spindle when doing heavy work.

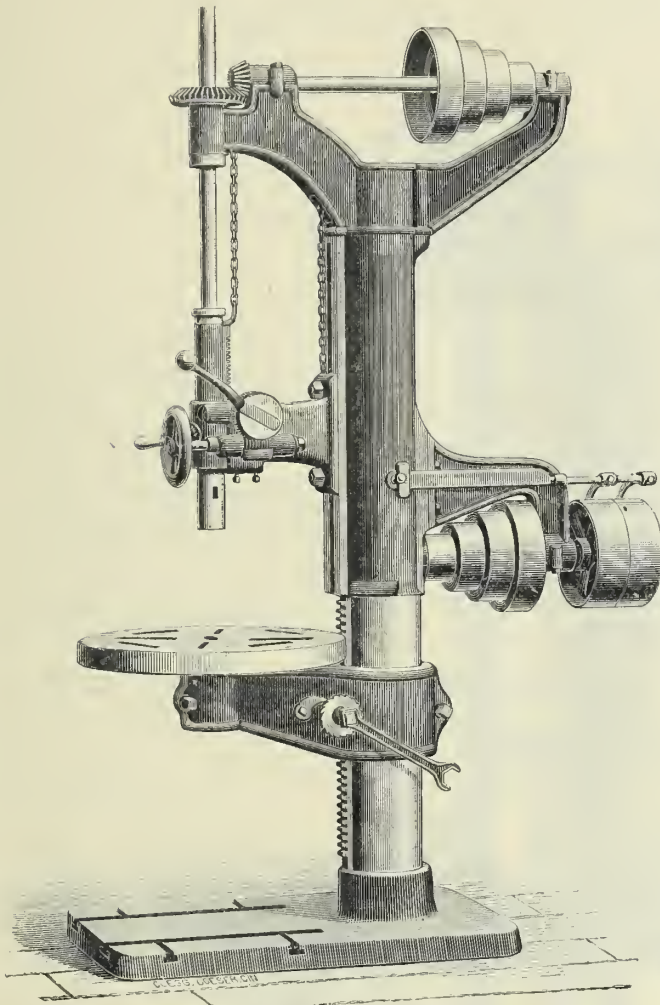
The spindle is made of crucible steel, the bearing being 1 5/8 inches diameter. The head and spindle traverse together a distance of 22 inches. The back gearing may be connected or disconnected quickly by means of the lever descending parallel with the column. The arm on which the table rests is raised or lowered by means of a crank in connection with a worm and worm gear. A friction countershaft can be furnished, when desired, for tapping purposes.

SPECIFICATIONS.

Distance from post to center of table, 11 1/2 inches. Greatest distance from spindle to base, 48 inches. Greatest distance from spindle to table, 33 inches. Vertical traverse of spindle, 22 inches. Hole in spindle conforms to Morse taper No. 3. Diameter to spindle, 1 5/8 inches. Ratio of back gearing, 4 to 1. Width of belt on cones, 2 1/2 inches. Diameter of face plate, 19 3/4 inches. Diameter of driving pulleys, 12 inches. Face of driving pulleys, 3 inches. Speed of lower shaft, 275 revolutions. Automatic feeding capacity to spindle, 22 inches. Required floor space, 20 x 55 inches. Weight, 1300 pounds.

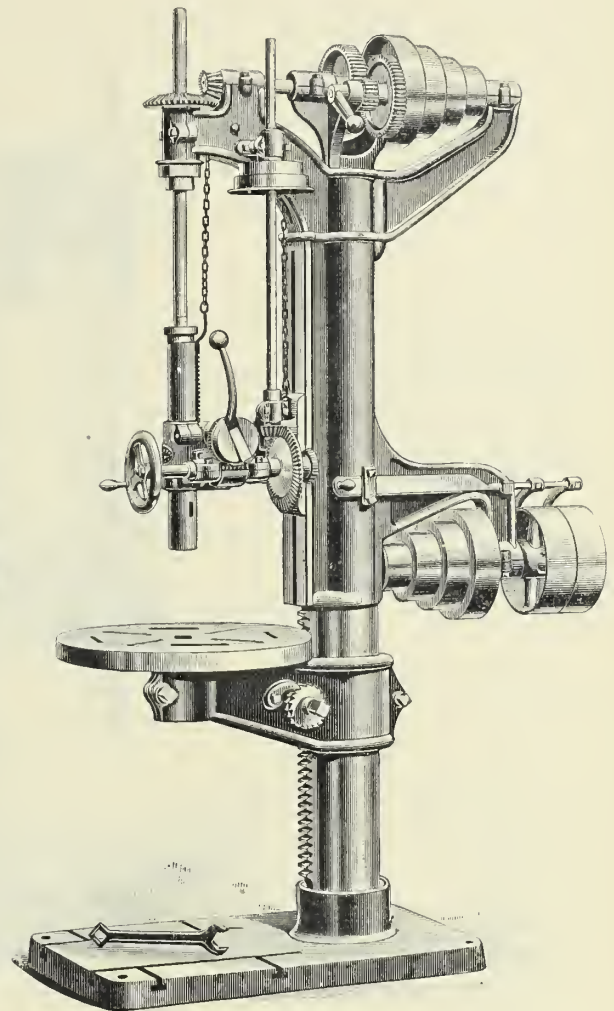
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FIG. 262.



24 INCH PLAIN UPRIGHT DRILL.

FIG. 263.



24 INCH UPRIGHT BACK GEARED AND POWER FEED DRILL.

24 INCH PLAIN UPRIGHT DRILL.

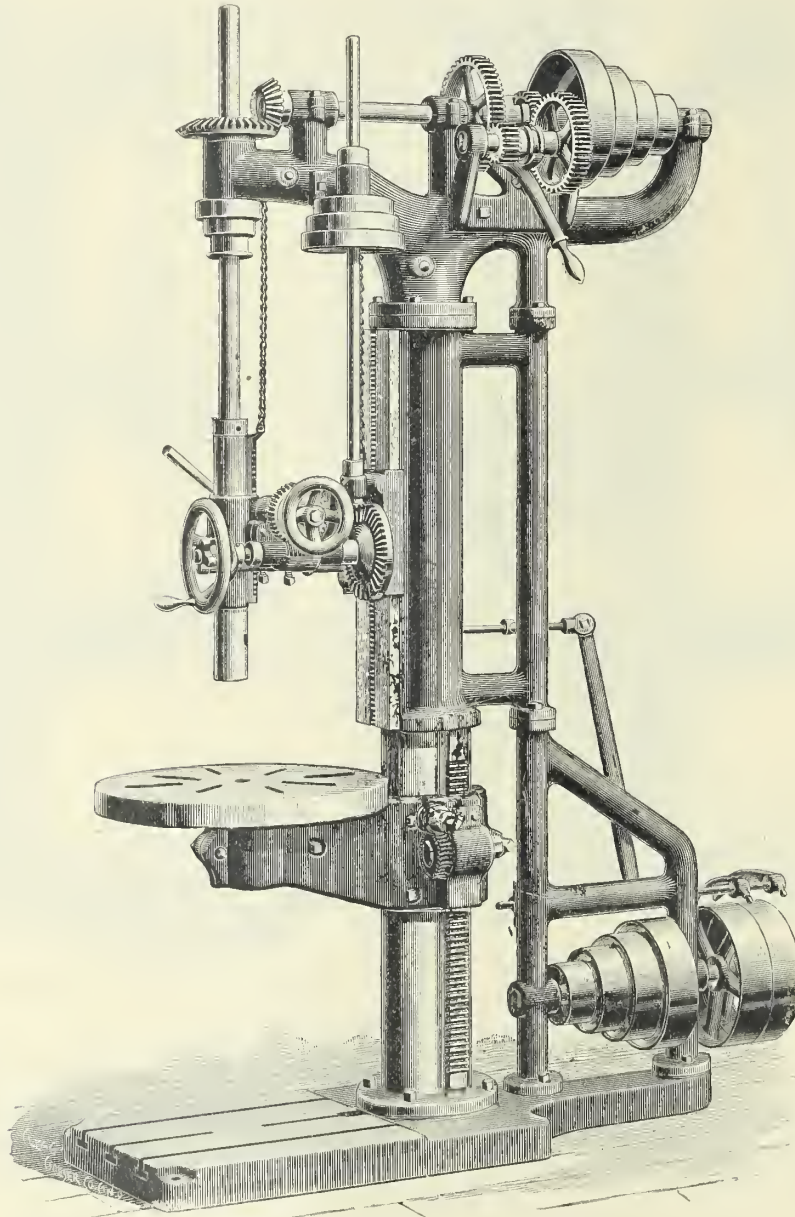
THIS DRILL has wheel feed and patent quick return motion. The spindle is of steel, counterbalanced by weight inside of column. Bevel gear, pinion and feed rack are cut from the solid. The table is adjusted to height by rack and pinion, turns in the arm, and swings around the column. The shafts are of steel. The drill is heavy, strong and convenient. The column is 7 inches in diameter, 7 feet high; drills to the center of 24 inches diameter. The table is 24 inches in diameter. The distance from table to end of spindle is 34 inches; from base to end of spindle is 48 inches. The spindle is 1 7-16 inches in diameter, bored to fit No. 3 Morse taper. Bevel gear is 7 inches in diameter. Pinion runs two to one. Cone pulleys, 4 changes, 4½, 6½, 8½, 10½ inches in diameter. Tight and loose pulleys, 10 inches in diameter, all for 2½ inch belt, and should run 250 revolutions. Weight, 1500 pounds.

24 INCH UPRIGHT BACK GEARED AND POWER FEED DRILL.

THIS DRILL has wheel feed and patent quick return motion. The spindle is of steel, counterbalanced by weight inside of column. Bevel gear, pinion and feed rack are cut from the solid. The table is adjusted to height by rack and pinion, turns in the arm, and swings around the column. The shafts are of steel. The drill is heavy, strong and convenient. The column is 7 inches in diameter, 7 feet high; drills to the center of 24 inches diameter. The table is 24 inches in diameter. The distance from table to end of spindle is 34 inches; from base to end of spindle is 48 inches. The spindle is 1 7-16 inches in diameter, bored to fit No. 3 Morse taper. Bevel gear is 7 inches in diameter. Pinion runs two to one. Cone pulleys, four changes, 4½, 6½, 8½, 10½ inches in diameter. Tight and loose pulleys, 10 inches in diameter, all for 2½-inch belt, and should run 250 revolutions. The Drill can also be furnished without power feed, if desired. Weight, 1500 pounds.

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FIG. 264.



24 AND 26 INCH UPRIGHT DRILL,
WITH SLIDING HEAD, BACK GEARS, POWER FEED AND QUICK RETURN.



24 AND 26 INCH UPRIGHT DRILL,

WITH SLIDING HEAD, BACK GEARS, POWER FEED AND QUICK RETURN.

GENERAL DESCRIPTION.

THE above sizes of Drills, as illustrated on the opposite page, are of the same general design, and are built from new and heavy patterns, combining all valuable and modern improvements. All parts are especially designed with strict regard to proportions, so that they correspond to one another to secure strength and solidity, and be of easy and accurate operation.

They are heavily braced from top to base, so as to prevent the column from springing under the strain of heavy drilling.

The sliding head is gibbed to column and balanced, so as to hold it in position when fastening screws are loosened.

The quick return is fitted with an improved friction, with the quick return levers on the left hand side, and placed so as to be within easy reach and handy to operate.

Spindles are balanced to prevent them from dropping, and are made of steel and extra large.

Cones and bevel gears are extra large. All gears and racks are cut from the solid.

Back gears are thrown in and out by a single lever movement.

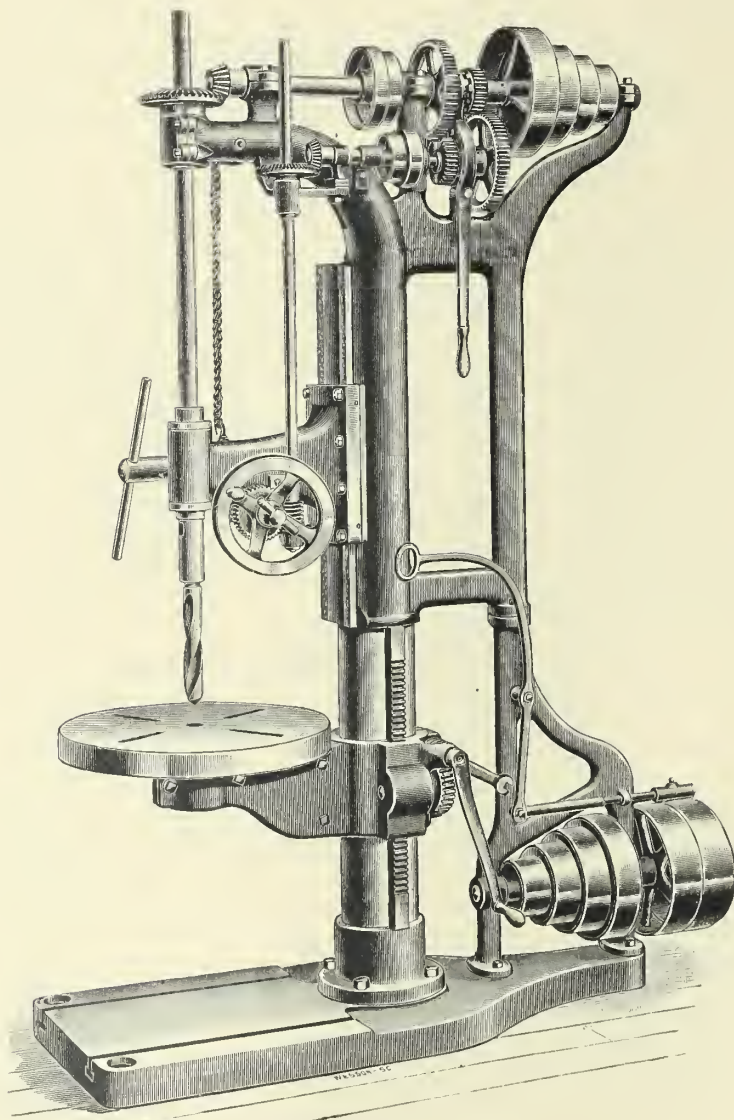
All the shafts and studs are made of steel.

SPECIFICATIONS.

Size of Drills,	-	-	-	-	-	-	-	-	-	24 Inches.	26 Inches.
Swing,	-	-	-	-	-	-	-	-	-	24 inches	26 inches
Height of Drill,	-	-	-	-	-	-	-	-	-	7 feet 2 inches	7 feet 3 inches
Diameter of column,	-	-	-	-	-	-	-	-	-	7 inches	7 ½ inches
Diameter of steel spindle,	-	-	-	-	-	-	-	-	-	1 9/16 inches	1 9/8 inches
Diameter of table,	-	-	-	-	-	-	-	-	-	20 inches	23 inches
Diameter of driving pulley,	-	-	-	-	-	-	-	-	-	11 inches	12 inches
Width of belt on driving pulley,	-	-	-	-	-	-	-	-	-	2 ½ inches	2 ½ inches
Width of belt on cones,	-	-	-	-	-	-	-	-	-	2 ½ inches	2 ½ inches
Largest sizes of cone,	-	-	-	-	-	-	-	-	-	11 inches	11 inches
Greatest distance from spindle to base plate,	-	-	-	-	-	-	-	-	-	48 inches	48 inches
Greatest distance from table to spindle,	-	-	-	-	-	-	-	-	-	34 inches	35 inches
Hole in spindle to fit Morse taper,	-	-	-	-	-	-	-	-	-	Number 3	Number 3
Speed of lower shaft,	-	-	-	-	-	-	-	-	-	270 revolutions	270 revolutions
Weight, complete,	-	-	-	-	-	-	-	-	-	1400 pounds	1700 pounds

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FIG. 265.



25 INCH SWING SNYDER UPRIGHT DRILL,

BACK GEARED, AUTOMATIC FEED.



25 INCH SNYDER UPRIGHT DRILL,
WITH BACK GEARS AND AUTOMATIC FEED.

GENERAL DESCRIPTION.

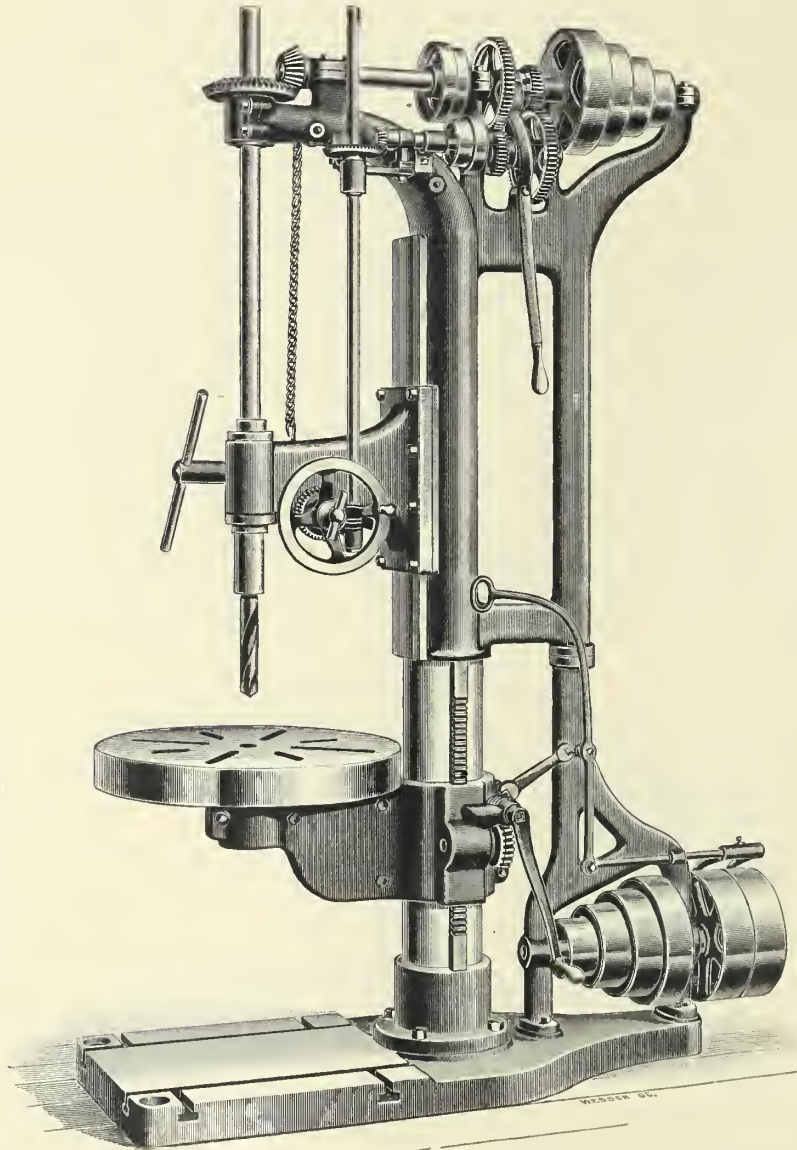
THE cut on the opposite page represents improved 25-inch swing upright Drill. This machine is furnished with back gears, automatic power feed, and a quick return, which all mechanics say is a great labor-saving feature. The spindle has a vertical automatic feed of 23 inches, which is an important point, especially when desirous of boring long holes. By the use of the quick return lever in front, in connection with rack and pinion gear, the head can be placed in any position on the face of the column, quickly, without the use of wrench or disconnecting any gears. This is a great labor-saving feature, especially when doing work which requires the head or spindle to be moved a long distance quickly. The head being 14 inches long, and firmly gibbed to the column, there is very little spring to the spindle when doing heavy work. The spindle is made of crucible steel. The head and spindle are both balanced by one weight, and both traverse together a distance of 23 inches on the face of column. The back gears are connected or disconnected quickly by means of a lever descending parallel with the column. The table is raised or lowered by means of a crank in connection with worm and worm gear. As will be seen, the column is strongly braced so as to resist all strain. A friction countershaft can be furnished at cost, when desired, for tapping purposes.

SPECIFICATIONS.

Distance from post to center of table,	-	-	-	-	-	12 $\frac{7}{8}$ inches
Greatest distance from spindle to base,	-	-	-	-	-	50 inches
Greatest distance from spindle to table,	-	-	-	-	-	33 $\frac{1}{2}$ inches
Vertical traverse of spindle,	-	-	-	-	-	23 inches
Hole in spindle conforms to Morse taper	-	-	-	-	-	No. 4
Diameter of spindle,	-	-	-	-	-	1 $\frac{5}{8}$ inches
Diameter of face plate,	-	-	-	-	-	22 inches
Ratio of back gearing,	-	-	-	-	-	4 to 1
Width of belt on cones,	-	-	-	-	-	2 $\frac{1}{2}$ inches
Diameter of driving pulleys,	-	-	-	-	-	12 x 3 inches
Face of driving pulleys,	-	-	-	-	-	3 inches
Speed of lower shaft,	-	-	-	-	-	275 revolutions
Automatic feeding capacity to spindle,	-	-	-	-	-	23 inches
Required floor space,	-	-	-	-	-	24 $\frac{1}{2}$ x 60 inches
Weight,	-	-	-	-	-	1600 pounds

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FIG. 266.



28-INCH SWING SNYDER DRILL,
WITH BACK GEARS AND AUTOMATIC FEED.



28-INCH SWING SNYDER DRILL,
WITH BACK GEARS AND AUTOMATIC FEED.

GENERAL DESCRIPTION.

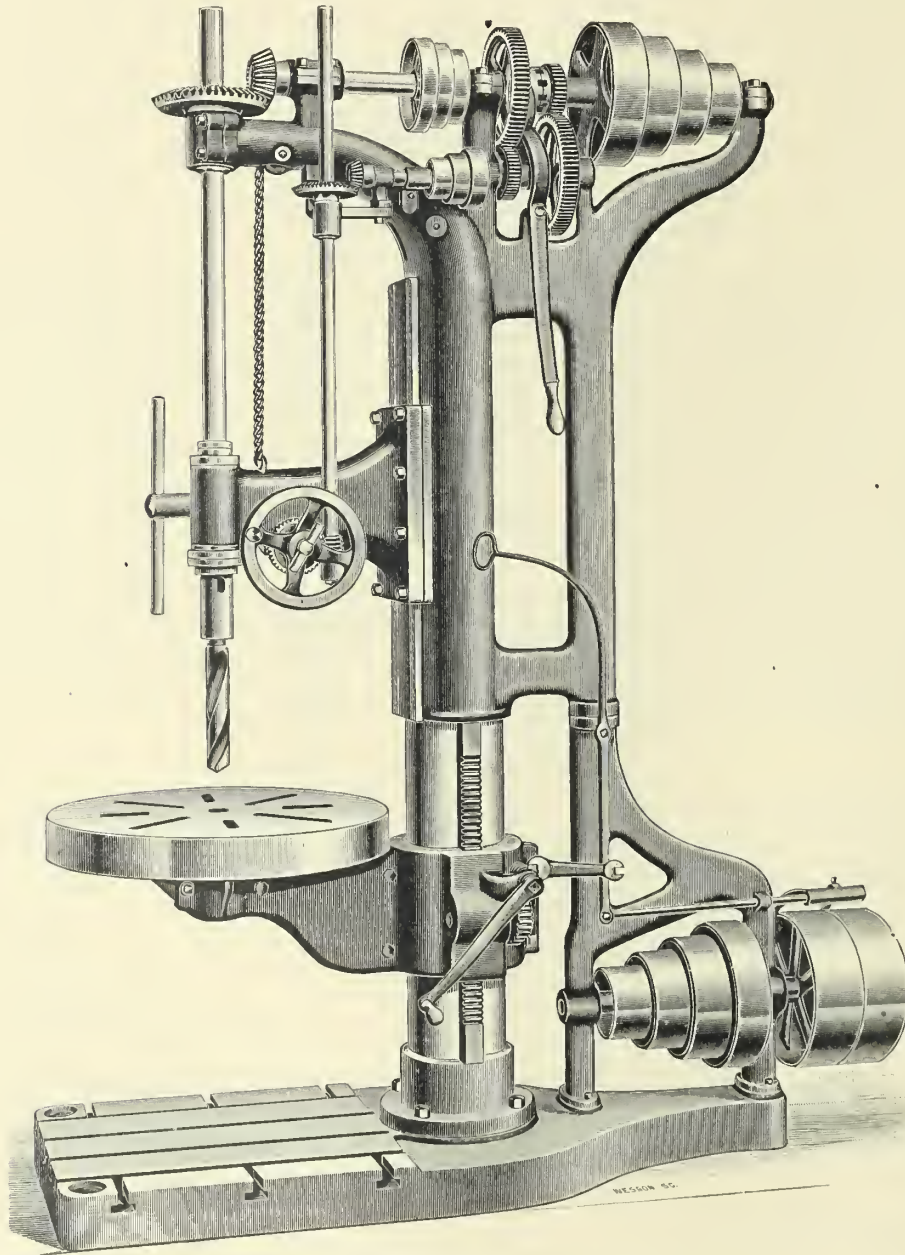
THE cut on the opposite page represents our 28-inch Upright Drill. This machine is furnished with back gears, automatic power feed, and our celebrated quick return, which all mechanics say is a great labor saving feature. The spindle has a vertical automatic feed of 24 inches, which is an important point, especially when desirous of boring long holes. By the use of the quick return lever in front, in connection with rack and pinion gear, the head can be placed in any position on the face of the column quickly, without the use of wrench or disconnecting any gears. This is a great labor-saving feature, especially when doing work which requires the head or spindle to be moved a long distance quickly. The head being 16 inches long, and firmly gibbed to the column, there is very little spring to the spindle when doing heavy work. The spindle is made of crucible steel. The head and spindle are both balanced by one weight, and both traverse together a distance of 24 inches on the face of column. The back gears are connected or disconnected quickly by means of a lever descending parallel with the column. The table and arm are raised or lowered by means of a crank in connection with worm and worm gear, and the table cannot fall when doing heavy work. As will be seen, the column is strongly braced so as to resist all strain. A friction countershaft can be furnished at cost, when desired, for tapping purposes.

SPECIFICATIONS.

Distance from post to center of table,	-	-	-	-	-	14 $\frac{1}{4}$ inches
Greatest distance from spindle to base,	-	-	-	-	-	54 inches
Vertical traverse of spindle,	-	-	-	-	-	24 inches
Hole in spindle conforms to Morse taper	-	-	-	-	-	No. 4
Diameter of spindle,	-	-	-	-	-	2 inches
Ratio of back gearing,	-	-	-	-	-	4 to 1
Width of belt on cones,	-	-	-	-	-	2 $\frac{1}{2}$ inches
Diameter of cone sections,	-	-	-	-	-	6, 8, 10, 12 inches
Diameter of driving pulleys,	-	-	-	-	-	13 inches
Face of driving pulleys,	-	-	-	-	-	4 inches
Diameter of face plate,	-	-	-	-	-	25 inches
Speed of lower shaft,	-	-	-	-	-	250 revolutions
Automatic feeding capacity to spindle,	-	-	-	-	-	24 inches
Required floor space,	-	-	-	-	-	26 x 66 inches
Weight,	-	-	-	-	-	2000 pounds

PRENTISS TOOL & SUPPLY CO.

FIG. 267.



30 INCH SWING SNYDER UPRIGHT DRILL,
WITH BACK GEARS AND AUTOMATIC FEED.



30 INCH SWING SNYDER UPRIGHT DRILL,

WITH BACK GEARS AND AUTOMATIC FEED.

GENERAL DESCRIPTION.

THE cut on the opposite page represents our new 30 inch back geared, automatic feed, quick return Upright Drill. This is a thoroughly well made tool, is very heavy, and is designed for doing heavy work. It is strongly back geared; the bevel gears are large, the ratio of the same being two to one. The cones are very large and are placed as far apart as possible.

The driving pulleys are 13 x 4 inches and should make 260 revolutions per minute.

The sliding head is 16 inches long and is strongly gibbed to the column.

The spindle is made of crucible steel.

Head bearing to spindle is $7\frac{3}{4}$ inches long and 2 inches diameter.

The spindle and sliding head are both balanced by one weight, and by our patented quick return the head can be placed in any position on the face of column quickly without the use of any wrench.

This Drill has an automatic feeding capacity of 27 inches without stopping, which is an important feature when boring long holes.

The back gears are connected or disconnected quickly by means of a lever descending parallel with the column.

The table and arm are raised or lowered by means of a crank in connection with worm and worm gear, and the table cannot fall when doing heavy work.

All of our Drills are especially adapted to boring purposes. The automatic feed can be stopped from either side of the machine, and the sliding head can be placed in any position on face of column when the drill is running, without stopping the feed. Many of the best equipped plants in the country are now using these machines, and as far as we have learned they are giving perfect satisfaction. Every drill is tested by actual work and known to be all right before leaving our hands.

SPECIFICATIONS.

Distance from post to center of table,	-	-	-	-	-	15 $\frac{1}{4}$ inches
Greatest distance from spindle to base,	-	-	-	-	-	54 inches
Greatest distance from spindle to table,	-	-	-	-	-	35 $\frac{1}{2}$ inches
Vertical traverse of spindle,	-	-	-	-	-	27 inches
Hole in spindle conforms to Morse taper	-	-	-	-	-	No. 4
Diameter of spindle,	-	-	-	-	-	2 inches
Diameter of face plate,	-	-	-	-	-	26 $\frac{3}{4}$ inches
Ratio of back gearing,	-	-	-	-	-	4 to 1
Width of belt on cones,	-	-	-	-	-	3 inches
Diameter of driving pulleys,	-	-	-	-	-	13 inches
Face of driving pulleys	-	-	-	-	-	4 inches
Speed of lower shaft,	-	-	-	-	-	260 revolutions
Automatic feeding capacity to spindle,	-	-	-	-	-	27 inches
Required floor space,	-	-	-	-	-	25 x 69 inches
Weight,	-	-	-	-	-	2400 pounds

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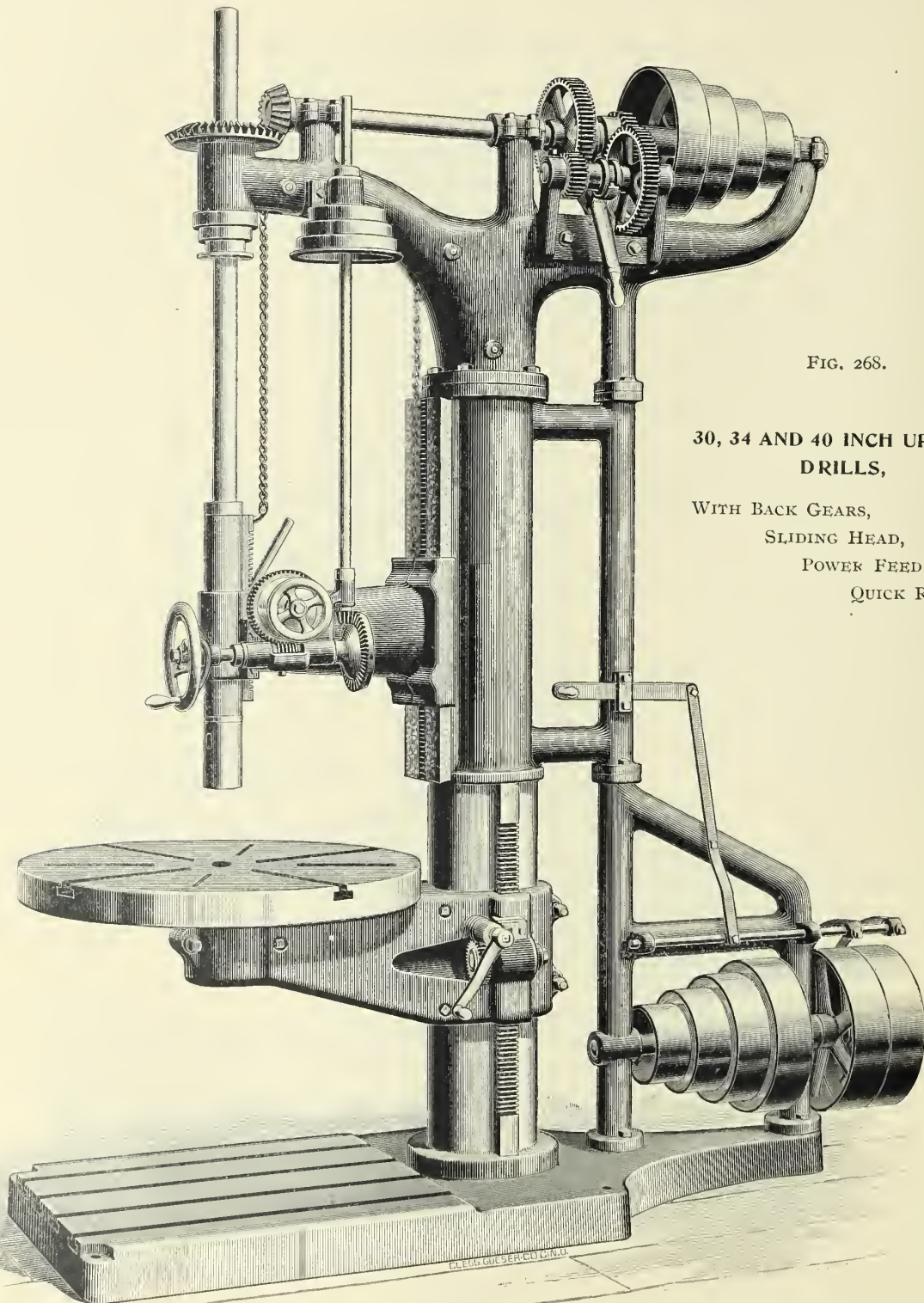


FIG. 268.

30, 34 AND 40 INCH UPRIGHT
DRILLS,

WITH BACK GEARS,
SLIDING HEAD,
POWER FEED AND
QUICK RETURN.



30, 34 AND 40 INCH UPRIGHT DRILLS,

WITH BACK GEARS, SLIDING HEAD, POWER FEED AND QUICK RETURN.

GENERAL DESCRIPTION.

THESE DRILLS are of the same general design, built from new and heavy patterns, and combine all valuable and modern improvements in use by drill builders. All parts are especially designed with strict regard to its proportions, so that they correspond to one another to secure strength and solidity, and be of easy and accurate operation.

They are heavily braced from top to base, so as to prevent the column from springing under the strain of heavy drilling.

The sliding head is gibbed to column and balanced, so as to hold it in position when fastening screws are loosened.

The quick return is fitted with an improved friction, with the quick return levers on the left hand side, and placed so as to be within easy reach and handy to operate.

Spindles are balanced to prevent them from dropping, and are made of steel and extra large.

Cones and bevel gears are extra large. All gears and racks are cut from the solid.

Back gears are thrown in and out by a single lever movement.

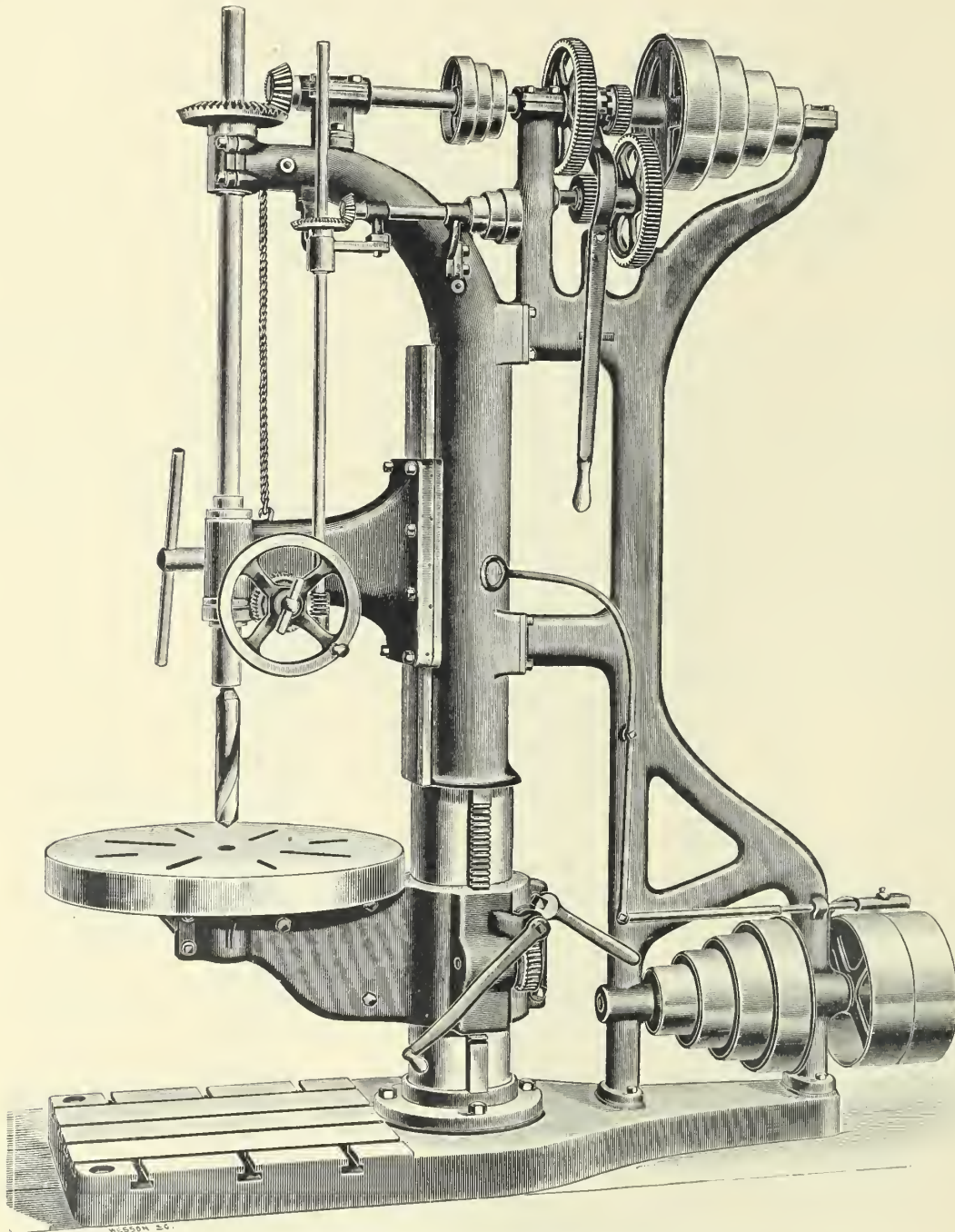
All the shafts and studs are made of steel.

SPECIFICATIONS.

Swing, - - - - -	30 Inches.	34 Inches.	40 Inches.
Height of Drill, - - - - -	7 feet 7 inches	8 feet 2 inches	9 feet 6 inches
Diameter of column, - - - - -	8 inches	9 inches	10½ inches
Diameter of steel spindle, - - - - -	1½ inches	2⅜ inches	2⅝ inches
Diameter of table, - - - - -	26 inches	30 inches	36 inches
Diameter of driving pulley, - - - - -	12 inches	14 inches	16 inches
Width of belt on driving pulley, - - - - -	3 inches	3 inches	4 inches
Width of belt on cones, - - - - -	3 inches	3 inches	3½ inches
Largest sizes of cone, - - - - -	13 inches	14 inches	15 inches
Greatest distance from spindle to base plate, - - - - -	50 inches	52 inches	58 inches
Greatest distance from table to spindle, - - - - -	36 inches	38 inches	41 inches
Hole in spindle to fit Morse taper, - - - - -	No. 4	No. 4	No. 5
Speed of lower shaft, - - - - -	240 revolutions	200 revolutions	150 revolutions
Weight, complete, - - - - -	2000 pounds	2600 pounds	3500 pounds

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FIG. 269.



34 INCH SWING SNYDER UPRIGHT DRILL,
WITH BACK GEARS AND AUTOMATIC FEED.



34 INCH SWING SNYDER UPRIGHT DRILL,
WITH BACK GEARS AND AUTOMATIC FEED.

GENERAL DESCRIPTION.

THE cut on the opposite page represents a 34 inch swing back geared, automatic feed, quick return Upright Drill. This is a very heavy and thoroughly made tool, and is designed for locomotive work, tool work, and all shops where a heavy, first-class Drill is needed. For accuracy of finish, strength, capacity, durability, and convenience in operating, this Drill has no superior. It has an automatic drilling capacity of 30 inches without stopping, which is an important feature, especially when boring very long holes. It has the same swinging capacity the entire length of column. The head and spindle are both balanced by one weight, and by our patented quick return, the head can be placed in any position on face of column quickly, without the use of any wrench. The sliding head is 18 inches long, has a bearing the entire length, and is firmly gibbed to the column. The cones are large and placed as far apart as possible. The spindle is made of crucible steel, and the bearing in the head is 9 inches long and $2\frac{1}{4}$ inches diameter. Every drill is tested by actual work before leaving the works, and known to be in perfect running order.

SPECIFICATIONS.

Distance from post to center of table,	-	-	-	-	-	-	-	17 $\frac{1}{4}$ inches
Greatest distance from spindle to base,	-	-	-	-	-	-	-	50 inches
Greatest distance from spindle to table,	-	-	-	-	-	-	-	38 inches
Vertical traverse of spindle,	-	-	-	-	-	-	-	30 inches
Hole in spindle conforms to Morse taper	-	-	-	-	-	-	-	No. 4
Diameter of spindle,	-	-	-	-	-	-	-	2 $\frac{1}{4}$ inches
Ratio of back gearing,	-	-	-	-	-	-	-	5 $\frac{1}{3}$ to 1
Width of belt on cones,	-	-	-	-	-	-	-	3 inches
Diameter of driving pulleys,	-	-	-	-	-	-	-	14 inches
Face of driving pulleys,	-	-	-	-	-	-	-	4 inches
Speed of lower shaft,	-	-	-	-	-	-	-	225 revolutions
Automatic feeding capacity to spindle,	-	-	-	-	-	-	-	30 inches
Required floor space,	-	-	-	-	-	-	-	28 x 76 inches
Weight,	-	-	-	-	-	-	-	3000 pounds

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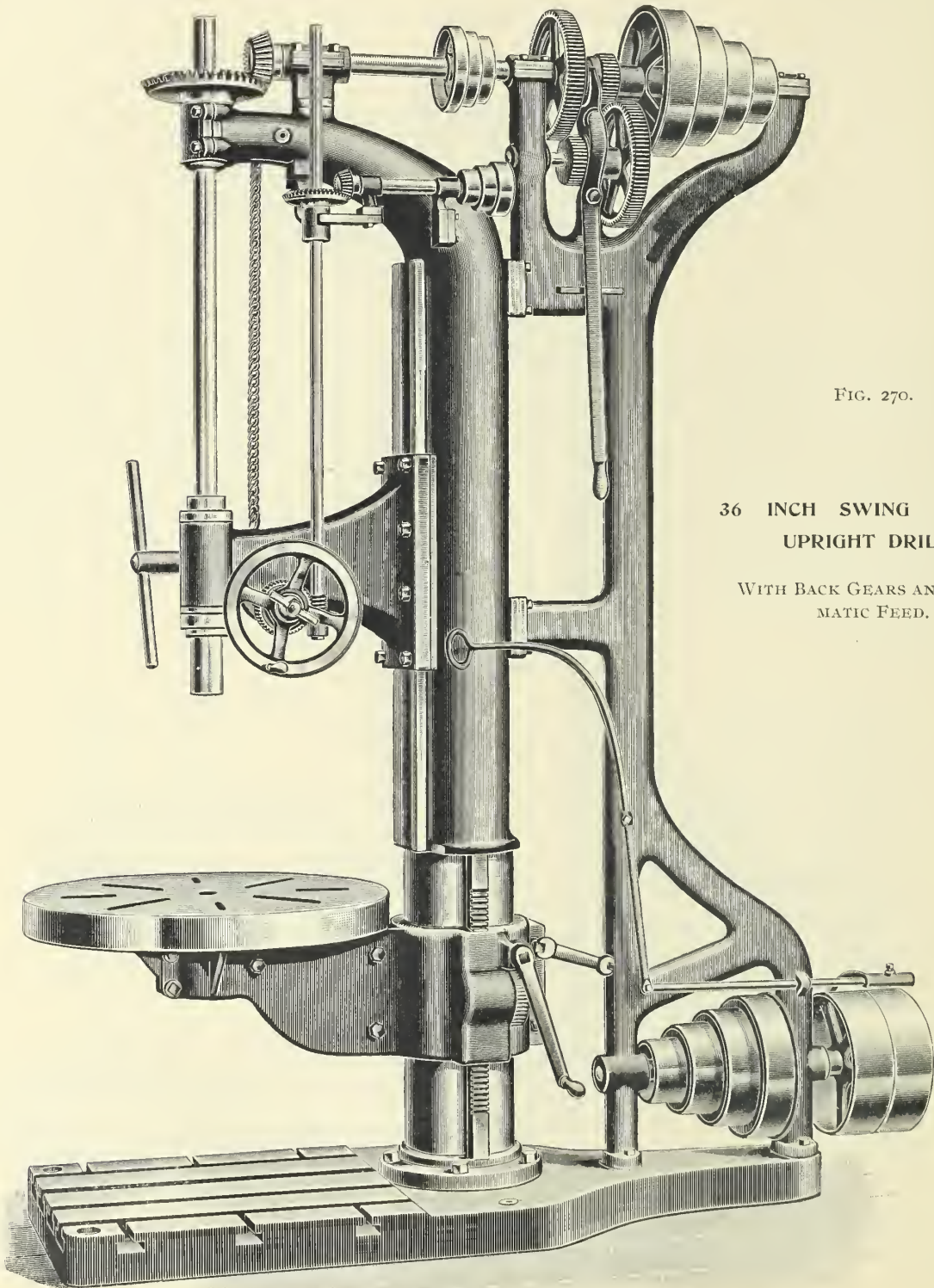


FIG. 270.

36 INCH SWING SNYDER
UPRIGHT DRILL,

WITH BACK GEARS AND AUTO-
MATIC FEED.



36 INCH SWING SNYDER UPRIGHT DRILL,

WITH BACK GEARS AND AUTOMATIC FEED.

GENERAL DESCRIPTION.

THE cut on the opposite page represents an improved 36 inch Upright Drill. This machine is furnished with back gears, automatic power feed, and a patent quick return, which is a great labor saving feature and one worthy of consideration. It has an automatic power feed of 29 inches, which is of great importance, especially when boring very long holes. The head and spindle both travel together, and are both balanced by one weight. The head can be placed at any required position on the face of column quickly by means of quick return lever in front, in connection with steel rack and pinion gear, without disconnecting any gears, or the use of a wrench, thus doing away with the old style of unbolting the head when obliged to change the position of the same, as is the case with other drills now on the market. The bearing to head being 19½ inches long, and firmly gibbed to the column, there can be very little spring to spindle when doing heavy work. The spindle is made of crucible steel, with bearing in head 2½ inches diameter by 9 inches long, and is provided with Brownell's patent roller bearing, which is a great saving of power. The back gears can be quickly connected or disconnected, by means of lever descending parallel with the column. The arm on which the table rests is raised or lowered by means of a crank in connection with worm and worm gear, and the table cannot fall when doing heavy work. A patent friction countershaft can be furnished at cost, when desired, for tapping purposes. The cones, pulleys, bevel and spur gears are very large and powerful, and are designed especially for doing heavy work. These drills are in use in many of the best equipped plants in the country.

SPECIFICATIONS.

Distance from post to center of table,	-	-	-	-	-	-	-	18¾ inches
Greatest distance from spindle to base,	-	-	-	-	-	-	-	56 inches
Greatest distance from spindle to table,	-	-	-	-	-	-	-	38 inches
Vertical traverse of spindle,	-	-	-	-	-	-	-	29 inches
Hole in spindle conforms to Morse taper	-	-	-	-	-	-	-	No. 4
Diameter of spindle,	-	-	-	-	-	-	-	2¼ inches
Ratio of back gearing,	-	-	-	-	-	-	-	5½ to 1
Width of belt on cones,	-	-	-	-	-	-	-	3 inches
Diameter of driving pulleys,	-	-	-	-	-	-	-	14 inches
Face of driving pulleys,	-	-	-	-	-	-	-	4 inches
Speed of lower shaft,	-	-	-	-	-	-	-	225 revolutions
Automatic feeding capacity to spindle,	-	-	-	-	-	-	-	29 inches
Required floor space,	-	-	-	-	-	-	-	30 x 84 inches
Weight,	-	-	-	-	-	-	-	4000 pounds

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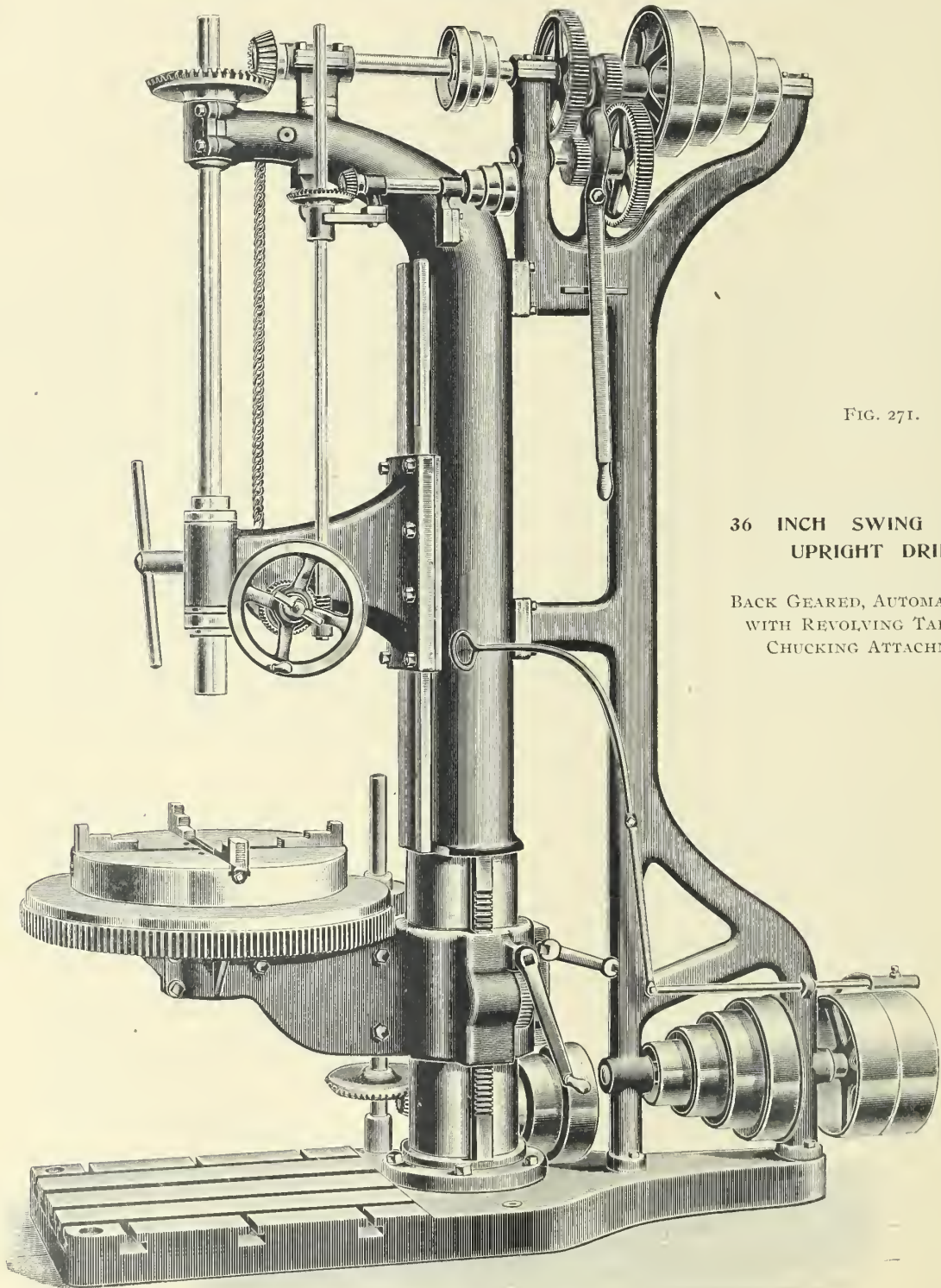


FIG. 271.

36 INCH SWING SNYDER
UPRIGHT DRILL,

BACK GEARED, AUTOMATIC FEED,
WITH REVOLVING TABLE AND
CHUCKING ATTACHMENTS.



36 INCH SWING SNYDER UPRIGHT DRILL,

BACK-GEARED, AUTOMATIC FEED, WITH REVOLVING TABLE AND CHUCKING ATTACHMENTS.

GENERAL DESCRIPTION.

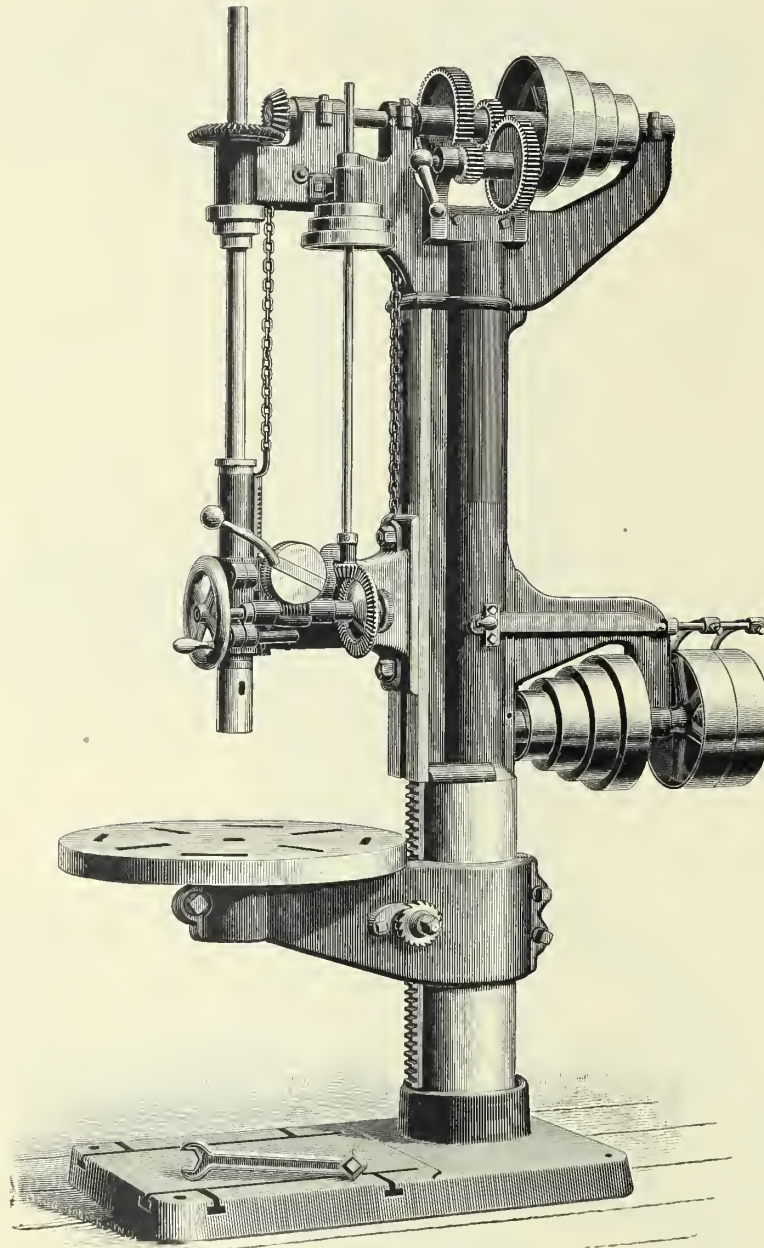
THE cut on opposite page is our regular 36 inch Drill, arranged for boring or chucking purposes. The table is made to revolve independent of the spindle by means of an extra countershaft, in connection with cone, bevel, and spur gears, which enables the operator to true up work with accuracy and rapidity. This is a very handy tool for heavy, long boring purposes. With the proper boring bars this tool is capable of boring large holes quickly and accurately. We have furnished some of the largest plants in the country with this Drill.

SPECIFICATIONS.

Distance from post to center of table,	-	-	-	-	-	-	18 $\frac{3}{8}$ inches
Greatest distance from spindle to base,	-	-	-	-	-	-	56 inches
Greatest distance from spindle to table,	-	-	-	-	-	-	38 inches
Vertical traverse of spindle,	-	-	-	-	-	-	29 inches
Hole in spindle conforms to Morse taper	-	-	-	-	-	-	No. 4
Diameter of spindle,	-	-	-	-	-	-	2 $\frac{1}{4}$ inches
Ratio of back gearing,	-	-	-	-	-	-	5 $\frac{1}{3}$ to 1
Diameter of driving pulleys,	-	-	-	-	-	-	14 inches
Face of driving pulleys,	-	-	-	-	-	-	4 inches
Speed of lower shaft,	-	-	-	-	-	-	225 revolutions
Automatic feeding capacity to spindle,	-	-	-	-	-	-	29 inches
Required floor space,	-	-	-	-	-	-	30 x 84 inches
Weight,	-	-	-	-	-	-	4000 pounds

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FIG. 272.

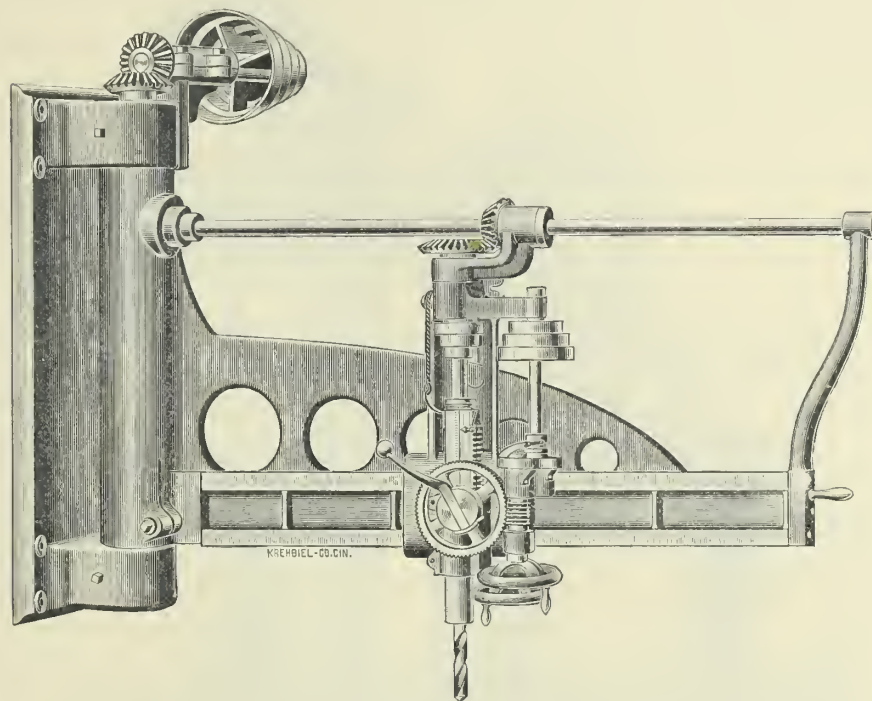


38 INCH UPRIGHT DRILL,
BACK GEARED AND POWER FEED.

THIS DRILL can be made a back geared, or a back geared and power feed Drill. It has the patent quick return motion of the spindle. The latter is of steel, counterbalanced by weight inside of column. Feed rack and all gears are cut from the solid. The table is adjusted to height by rack and pinion, turns in the arm and swings around the column. The 38-inch column is $10\frac{1}{2}$ inches in diameter, $8\frac{3}{4}$ feet high; drills to the center of 38 inches in diameter. The table is 36 inches in diameter. The distance from table to end of spindle is 39 inches; from base to end of spindle is 54 inches. The spindle is 15-16 inches in diameter. Pinion runs two to one. Cone pulleys, four changes, 8, 10, 12, 14 inches in diameter. Tight and loose pulleys, 14 inches in diameter, all for 3-inch belt, and should run 200 revolutions. Weight, 3500 pounds.

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FIG. 273.



POST OR RADIAL WALL DRILL.

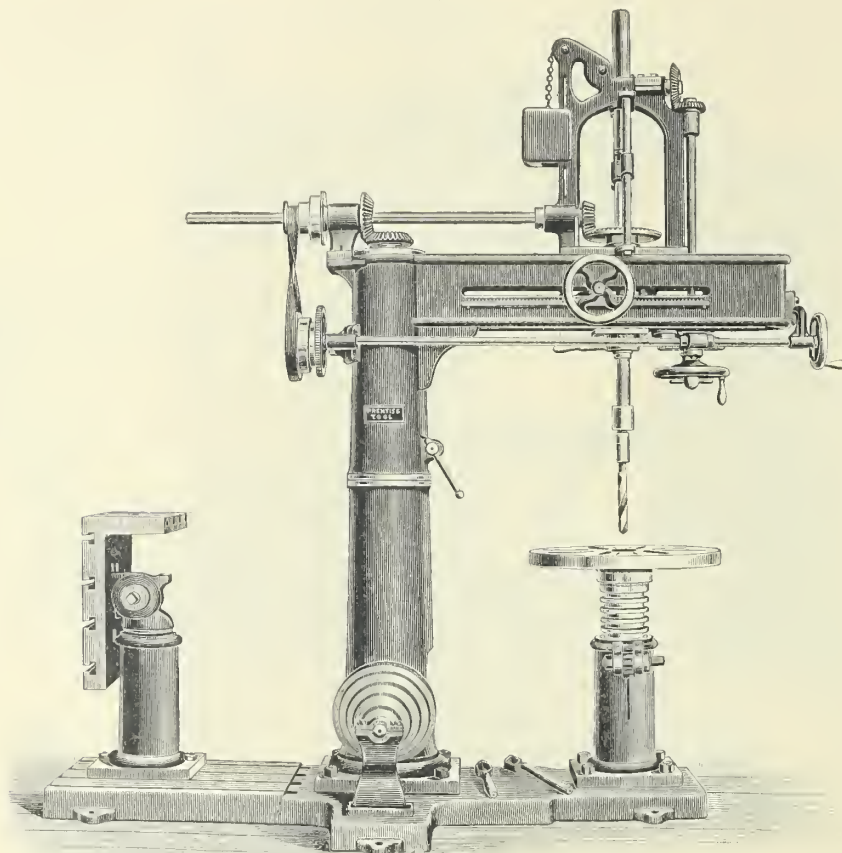
THIS DRILL is designed for drilling, reaming and countersinking large work in boiler shops, bridge works, architectural iron works, ship yards, etc. The bracket which supports the radial arm can be bolted, with its broad and long bearing, to a post or a wall, or if put up in a gang, clamped fast to two flat-lying I beams. The head is moveable on the arm by means of rack, pinion, and hand wheel, and can be securely locked to same. The arm can be secured rigidly to wall-plate by means of a clamping screw. The spindle has power feed, hand feed, quick return motion, and automatic stop. The machine has four different speeds, and three different feeds for spindle. Spindles are counterbalanced.

SPECIFICATIONS.

Distance between bearings on wall-plate,	-	-	-	-	-	-	-	3 feet
Length of wall-plate,	-	-	-	-	-	-	-	4 feet 4 inches
Width of wall-plate,	-	-	-	-	-	-	-	1 foot 4 inches
Length of radial arm from center of trunnion to end,	-	-	-	-	-	-	-	6 feet
Vertical range of spindle,	-	-	-	-	-	-	-	10 inches
Cone pulleys, four changes,	-	-	-	-	-	-	-	6, 8, 10 and 12 inches
Width of belt for cone pulleys,	-	-	-	-	-	-	-	3 inches
Size of tight and loose pulleys,	-	-	-	-	-	-	-	14 x 3 1/4 inches
Speed of countershaft,	-	-	-	-	-	-	-	200 revolutions

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FIG. 274.



RADIAL DRILL.

THIS DRILL is intended for a large range of work. It takes in a pulley up to four feet in diameter, and may be used for boring small cylinders and similar work.

The feed screw has adjustable automatic feed, and will feed 14 inches. The back gearing is all enclosed, preventing danger of catching the operator.

Socket hole in the spindle is made to fit Morse taper Nos. 3 or 4.

The circular table is 24 inches in diameter, and is bored to receive bushes for boring bars. The table can be raised or lowered without being turned around.

The square tilting table slips in slotted side of bed, and can be quickly removed. It is convenient for drilling work at any desired angle. It can also be used as a straight table.

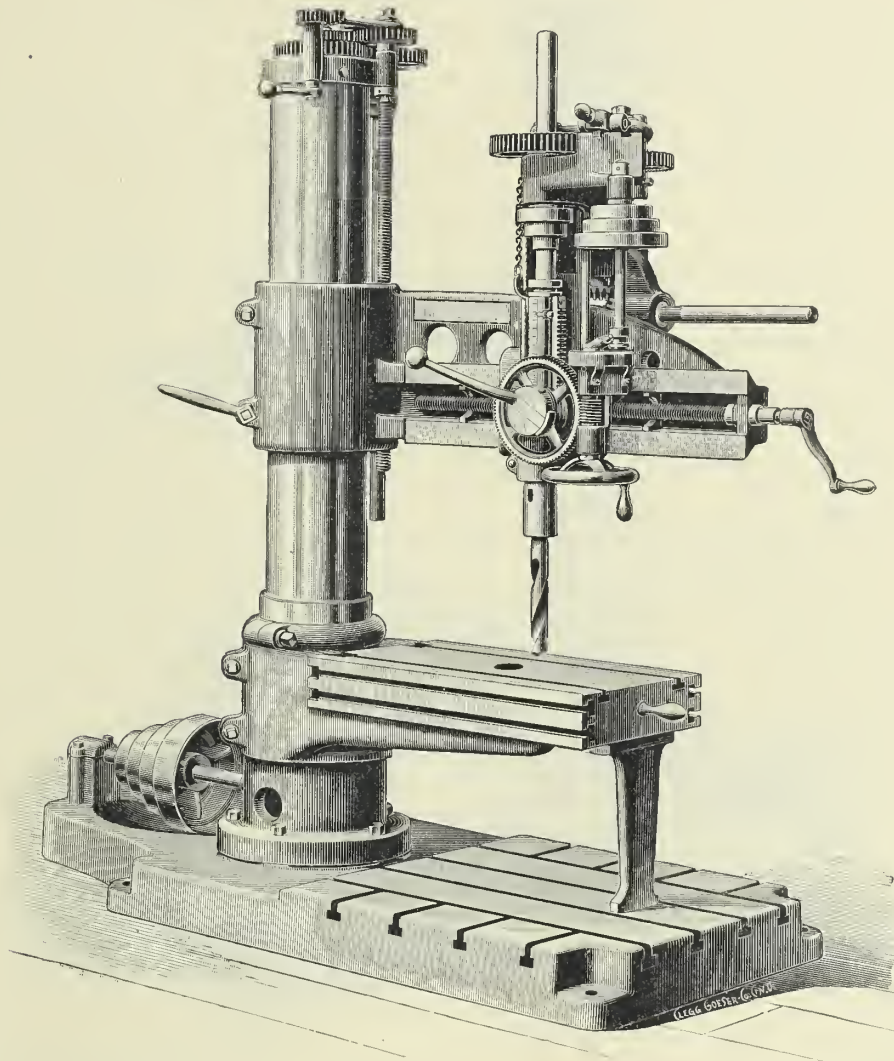
This Drill has a radius of 48 inches, giving a distance between column and spindle of 34 inches, and will drill to the center of a 68 inch circle. The column is 12 inches in diameter and six feet high. The entire height from floor to top of feed screw is 8 feet 10 inches.

The Drill has strong gearing and the boxes are easily renewed. The lower spindle box is brass, and is so constructed that the wear can be taken up by a simple turn of a nut. If there should be any lost motion in top of spindle it can be easily taken up.

The table stand has a perfect clamp to hold table firm at any desired height. Weight, 2800 pounds.

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FIG. 275.



No. 0 RADIAL DRILL,

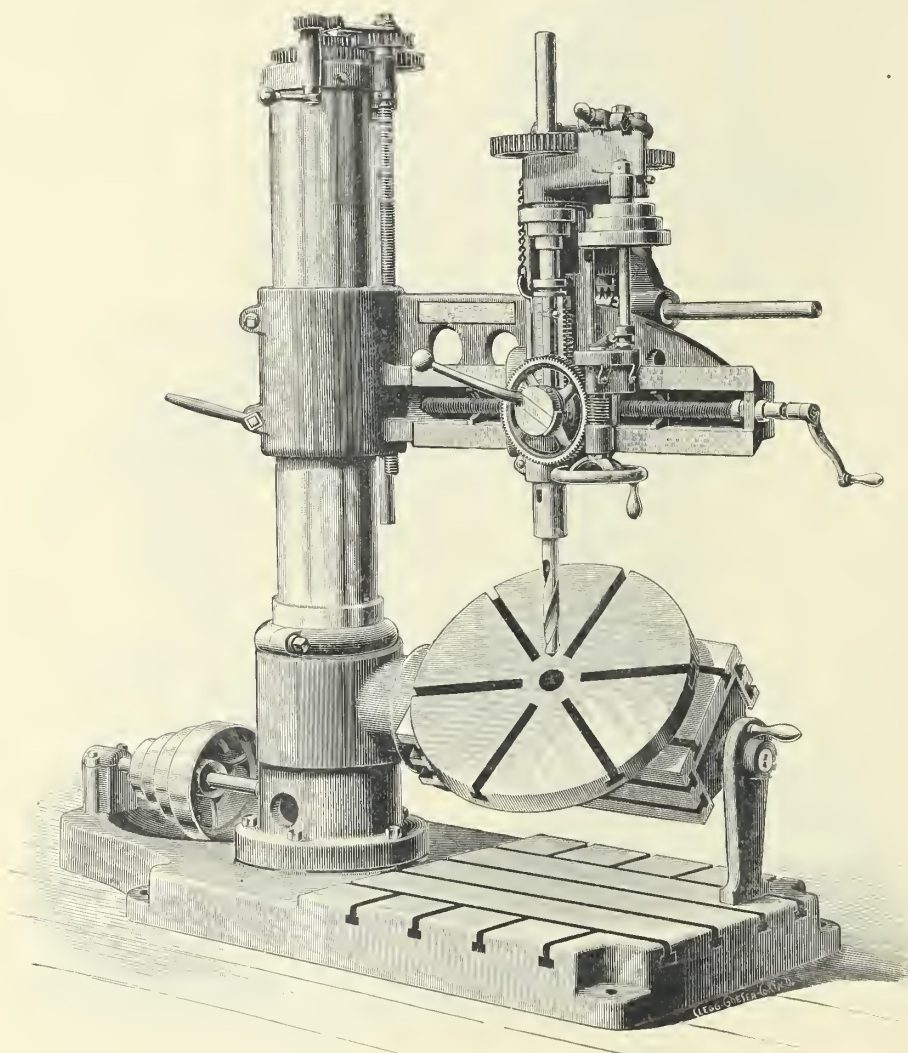
WITH BACK GEARS AND PLAIN TABLE.

A regular round drill press table can easily be fitted on to the plain table at a very moderate extra charge. Same is shown on following page.

For general description see page 277.

PRENTISS TOOL & SUPPLY CO.

FIG. 276.



NO. 0 RADIAL DRILL,

WITH BACK GEARS AND UNIVERSAL TILTING TABLE, WHICH IS FITTED WITH REGULAR
ROUND DRILL PRESS TABLE.

By the use of this arrangement of tables, almost the same results are produced as with a full Universal Radial Drill.

For general description see page 277.



No. 0 RADIAL DRILL.

GENERAL DESCRIPTION.

THE rotating column is mounted on a stationary column which is rigidly secured with its wide flange to the heavy T slotted base.

The stationary column has two offsets and extends half way into the upper rotating column, thus giving the machine a great stiffness, which is not found on any other Radial Drills of this type.

The table rests on the first one, and is accurately fitted to the same. At the outer end the table is provided with a foot for solid support. It can be locked tight to the column by means of clamping screws and can be swung completely off the base, in cases when the work requires to be set or bolted directly on the base.

The rotating column, or sleeve, rests on the second offset. This is tightened by means of an inside wedge-shaped clamping ring, which, by being drawn rigidly to its support, makes both a solid stand.

The arm is held in position on the rotating column by means of feather, screw, and clamping bolts. It can be raised and lowered by power by a very simple mechanism, which is within easy reach of the operator. On all other Drills of this size the arm must be raised and lowered by hand, which involves entirely too much labor and time.

The head is moved on the arm by means of a screw, and retains all the features of the "Bickford" head with quick return motion.

The back gears are placed directly on the head, and can be directly engaged while spindle rotates. In the same manner they can be disengaged, and the direct gearing thrown in while the machine is running. This arrangement also enables us to stop the spindle without reaching to the shifter. This is an entirely new and valuable feature which cannot be found on any other Drill on the market. It is time-saving, convenient, and practical, reducing the wear and tear of the machine, the strain being directly on the spindle and taken away from the usual long, transmitting shafts and journals.

The spindle has eight speeds and three changes of feed, is graduated, and has an entirely new automatic stop, quick-return motion, hand and power feed.

The cuts and dimensions shown herewith illustrate the machine in detail, and additional information will be cheerfully sent on. We guarantee this tool in every detail for strength, accuracy, convenience, workmanship, and performance.

The No. 0 Radial Drill will be furnished with or without back gears, with or without the universal tilting table, and with or without a round table fitted into the plain or universal tilting table.

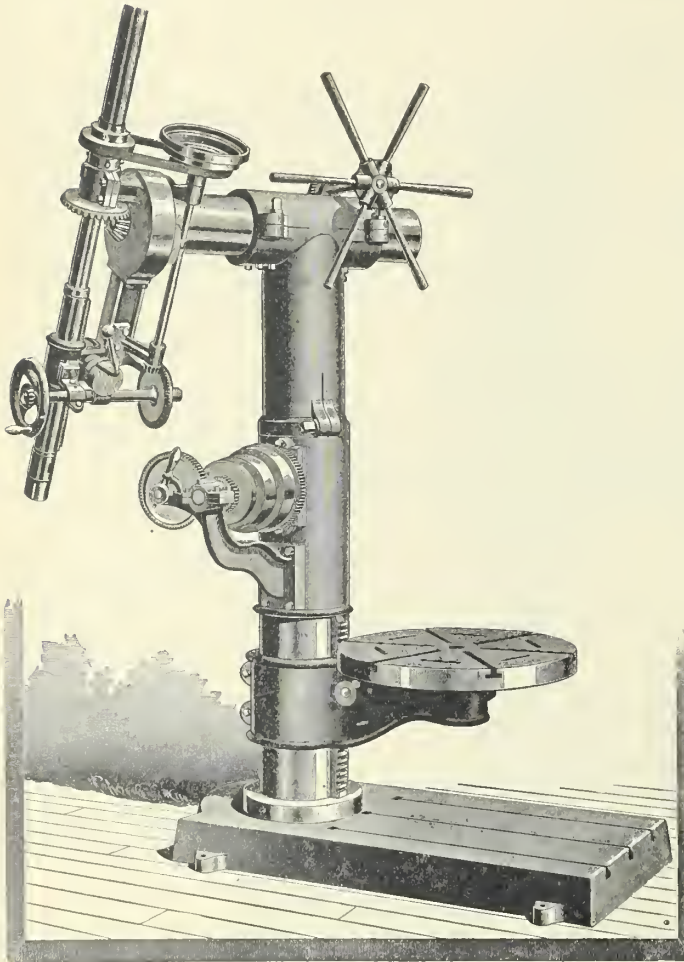
SPECIFICATIONS.

Diameter of column,	-	-	-	-	-	-	-	-	-	9 inches
Distance from floor to highest point of column,	-	-	-	-	-	-	-	-	-	6 feet 9 inches
Distance from elevating screw to center of drill spindle, when at the extreme point of arm,	-	-	-	-	-	-	-	-	-	2 feet 10½ inches
Drills to the center of a circle of	-	-	-	-	-	-	-	-	-	5 feet 9 inches
Vertical range of arm on column,	-	-	-	-	-	-	-	-	-	2 feet 6 inches
Receives under spindle, over base,	-	-	-	-	-	-	-	-	-	4 feet
Receives under spindle, over floor,	-	-	-	-	-	-	-	-	-	4 feet 6 inches
Height of table above base,	-	-	-	-	-	-	-	-	-	18½ inches
Size of table,	-	-	-	-	-	-	-	-	-	16 x 27 inches
Spindle bored to fit Morse taper,	-	-	-	-	-	-	-	-	-	No. 3
Diameter of spindle,	-	-	-	-	-	-	-	-	-	1⅞ inches
Traverse of spindle,	-	-	-	-	-	-	-	-	-	10 inches
Size of tight and loose pulleys,	-	-	-	-	-	-	-	-	-	12 x 2½ inches
Speed of countershaft,	-	-	-	-	-	-	-	-	-	250 revolutions
Width of belt for cone pulleys,	-	-	-	-	-	-	-	-	-	2½ inches
Floor space for base,	-	-	-	-	-	-	-	-	-	2 feet 8 inches x 6 feet 4 inches
Weight of drill, about	-	-	-	-	-	-	-	-	-	3000 pounds

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FIG. 277.

No. 0 UNIVERSAL RADIAL DRILL.



THE column, which is 10 inches in diameter, and firmly fastened to the sole plate, has a 20 inch bearing at top for top of column to revolve on, and carries the non-rotating arm. The arm, which is 7 inches in diameter, travels forward and backward through top of column or T, and on end of arm is a swivel face plate or head which carries spindle, and by this means carries power to spindle at any angle spindle may be placed, and the head is indexed to show different degrees.

The swivel face plate is double bearing, nicely fitted and perfect, so that spindle may be revolved the entire circle while machine is running, or held at any position by means of two clamps, one of which can be set up with wrench, and holds head perfectly solid at any angle with slight turn of the wrench. Thus a line or row of holes may be drilled at any angle, vertically upward or downward, and at any point around column, within range of the arm. Has power feed and five driving speeds for wide belt, and spindle bored to No. 4 Morse taper socket. Has round table 28 inches in diameter that can be turned to any point around column, and raised or lowered.

SPECIFICATIONS.

Diameter of column,	- - - - -	10 inches
Height of column,	- - - - -	6 feet 1 inch
Length of arm,	- - - - -	3 feet
Drills to center of circle, outside of column,	- - - - -	52 inches
Greatest distance from sole plate to end of spindle,	- - - - -	45 ins.
Greatest distance from floor to end of spindle,	- - - - -	50 inches
Size of table,	- - - - -	28 inches diameter
Diameter of spindle,	- - - - -	1 3/4 inches
Traverse of spindle,	- - - - -	20 inches
Size of countershaft pulleys,	- - - - -	12 x 3 inches
Speed,	- - - - -	170 revolutions
Width of belt on cones,	- - - - -	3 inches
Floor space required for base,	- - - - -	30 x 60 inches
Weight, about	- - - - -	2500 pounds

No. 1 UNIVERSAL RADIAL DRILL.

THE column, which is 10 inches in diameter and very heavy, is firmly fitted to base plate, and has a 20 inch bearing at the top of column for T to re-

volve on, and carries the non-rotating traveling arm, which is held from revolving by a long guide or bearing in a slot in the arm, which is well fitted in the T. The arm is moved freely back and forward by rack and pinion and a six handled hand wheel. The drilling spindle, which is on end of arm and held by a swivel face plate or head, is the means by which power is carried to spindle at any angle spindle may be placed, and head is indexed to show the different degrees of the circle. The swivel face plate is double bearing, nicely fitted and perfect, so that spindle may be revolved the entire circle while machine is running, or held at any position by means of two clamps, one of which can be set up with a wrench, and will hold the head perfectly tight. Thus a line or row of holes may be drilled at any angle, vertically upward or downward, and at any degree within range of the arm, and at any point around the column within length of arm, which makes a very complete drill for any class of drilling, being very quick of adjustment. Has power feed and back gear and quick return lever, enabling the workman to stand in front of his machine while operating, with the arm always back out of the way, which cannot be done with any other drill. Every machine is belted and tested before leaving the shop.

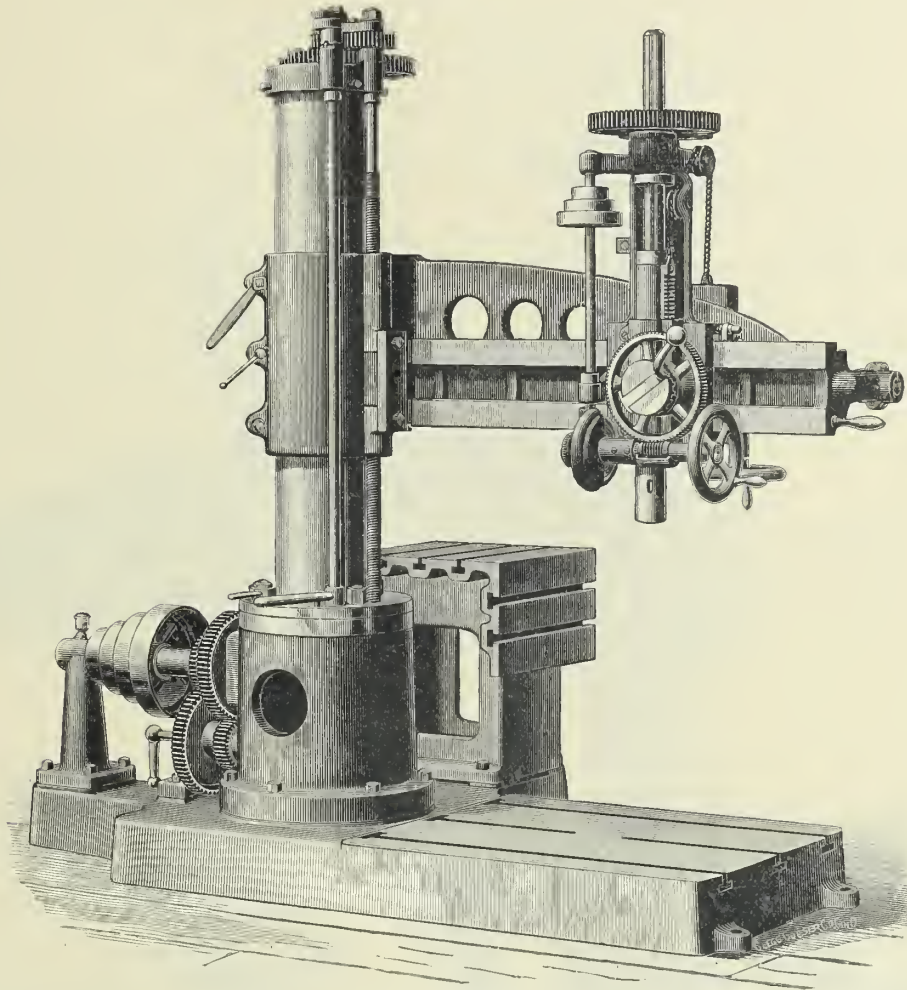
SPECIFICATIONS.

Diameter of column,	- - - - -	10 inches
Height of column,	- - - - -	6 feet 4 inches
Length of arm,	- - - - -	42 inches
Drills to center of circle, outside of column,	- - - - -	60 inches
Greatest distance from sole plate to end of spindle,	- - - - -	45 inches
Greatest distance from floor to end of spindle,	- - - - -	50 inches
Total height of machine, about	- - - - -	8 feet
Size of table,	- - - - -	28 inches diameter

Diameter of spindle,	- - - - -	1 3/4 inches
Size of hole in spindle, Morse socket No. 4.	- - - - -	
Traverse of spindle,	- - - - -	20 inches
Size of countershaft pulleys,	- - - - -	12 ins. diameter, 3 inch face
Speed,	- - - - -	180 revolutions
Width of belt on cones,	- - - - -	2 1/2 inches
Floor space required for base,	- - - - -	30 x 60 inches
Weight, about	- - - - -	3000 pounds

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FIG. 278.



Nos. 1, 2 AND 3 RADIAL DRILLS.

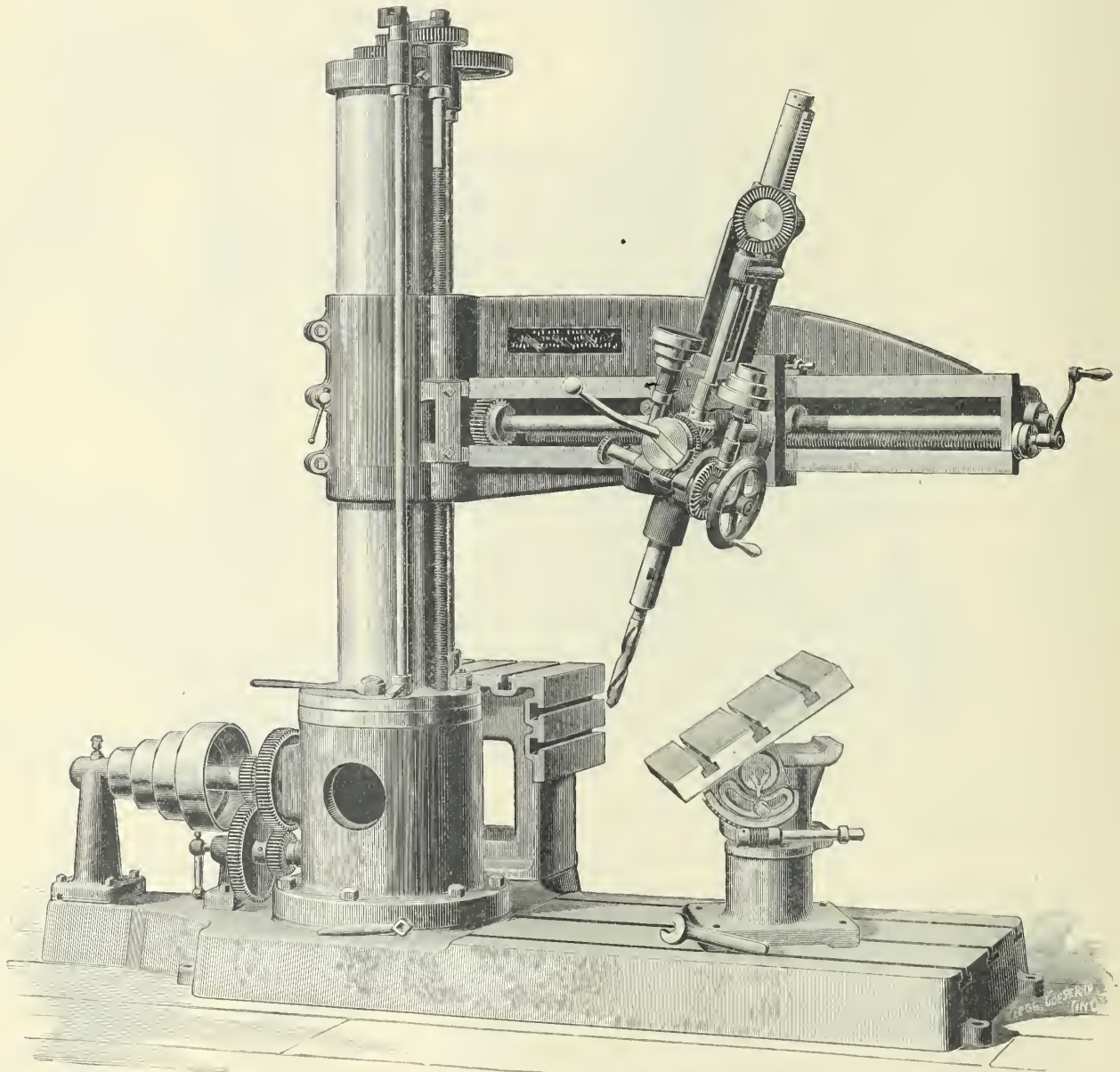
SPECIFICATIONS.

	No. 1.	No. 2.	No. 3.
Dimensions and weights, - - - - -	10 inches	11 inches	14 inches
Diameter of column, - - - - -	7 feet 3 inches	8 feet 2 inches	10 feet
Distance from floor to highest point of column, - - -	3 feet 7 inches	4 feet 6 inches	5 feet 6 inches
Distance from elevating screw to center of drill spindle, -	7 feet 2 inches	9 feet	11 feet
when at the extreme point of arm, - - - - -	2 feet 4 inches	2 feet 10 inches	4 feet
Drills to the center of a circle of - - - - -	4 feet 2½ inches	5 feet	6 feet 6 inches
Vertical range of arm on column, - - - - -	4 feet 9½ inches	5 feet 7½ inches	7 feet 2 inches
Receives under spindle, over base, - - - - -	2 feet	2 feet	2 feet 4 inches
Receives under spindle, over floor, - - - - -	20 x 20 inches	20 x 20 inches	28 x 28 inches
Height of table above base, - - - - -	No. 4	No. 5	No. 5
Size of table, - - - - -	1 13-16 inches	1 15-16 inches	2 7-16 inches
Spindle bored to fit Morse taper - - - - -	15 inches	20 inches	20 inches
Diameter of spindle, - - - - -	12 x 3 inches	14 x 3½ inches	16 x 3½ inches
Traverse of spindle, - - - - -	250 revolutions	250 revolutions	200 revolutions
Size of tight and loose pulleys, - - - - -	2½ inches	3 inches	3 inches
Speed of countershaft, - - - - -	4 feet 7 ins. x 7 feet 4 ins.	4 feet 8 ins. x 8 feet	6 ft. 10 ins. x 9 ft. 8 ins.
Width of belt for cone pulley, - - - - -	4500 pounds	5700 pounds	11000 pounds
Floor space for base, - - - - -			
Weight of drill, about - - - - -			

We furnished, when desired, the No. 2 Radial with arm one foot longer at a small extra cost.

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FIG. 279.



STYLES A AND D. HALF UNIVERSAL RADIAL DRILLS.



STYLES A AND D. HALF UNIVERSAL DRILLS.

THE base plate of these Drills is very heavy and deep, ribbed and braced on the under side so as to avoid all spring. The column, with large, round base, is bolted to the bottom plate, and over this column, with long bearing on top and bottom, is fitted the outside sleeve which carries the arm. The sleeve rests on the bottom, on a large flange, and is fitted with three clamping bolts. The rotating arm, fitted over sleeve, is of a box form, strongly braced on top and bottom, and raises and lowers by power. The flange of the sleeve is provided with a roller bearing which allows the arm to swing with perfect freedom. The machines are driven from cone pulley, shown on back of drill, and by means of mitre gears through inside of column to the top. All sizes are fitted with back gearing. The spindles are counterweighted, have powerful automatic feed and are fitted with patent quick return motion. We furnish a box table, slotted on top and side, and countershaft with tight and loose pulleys with each machine. We can also furnish a universal tilting table in place of the box table, if desired, at a small additional cost.

All shafts and spindles, likewise the worms and worm rings, are made of steel. All gearing is cut from the solid and the main gearing is made of steel. These tools throughout are very heavy, strong and convenient, and we guarantee them perfectly true and accurate in every respect. Only the very best material and workmanship are used in their construction.

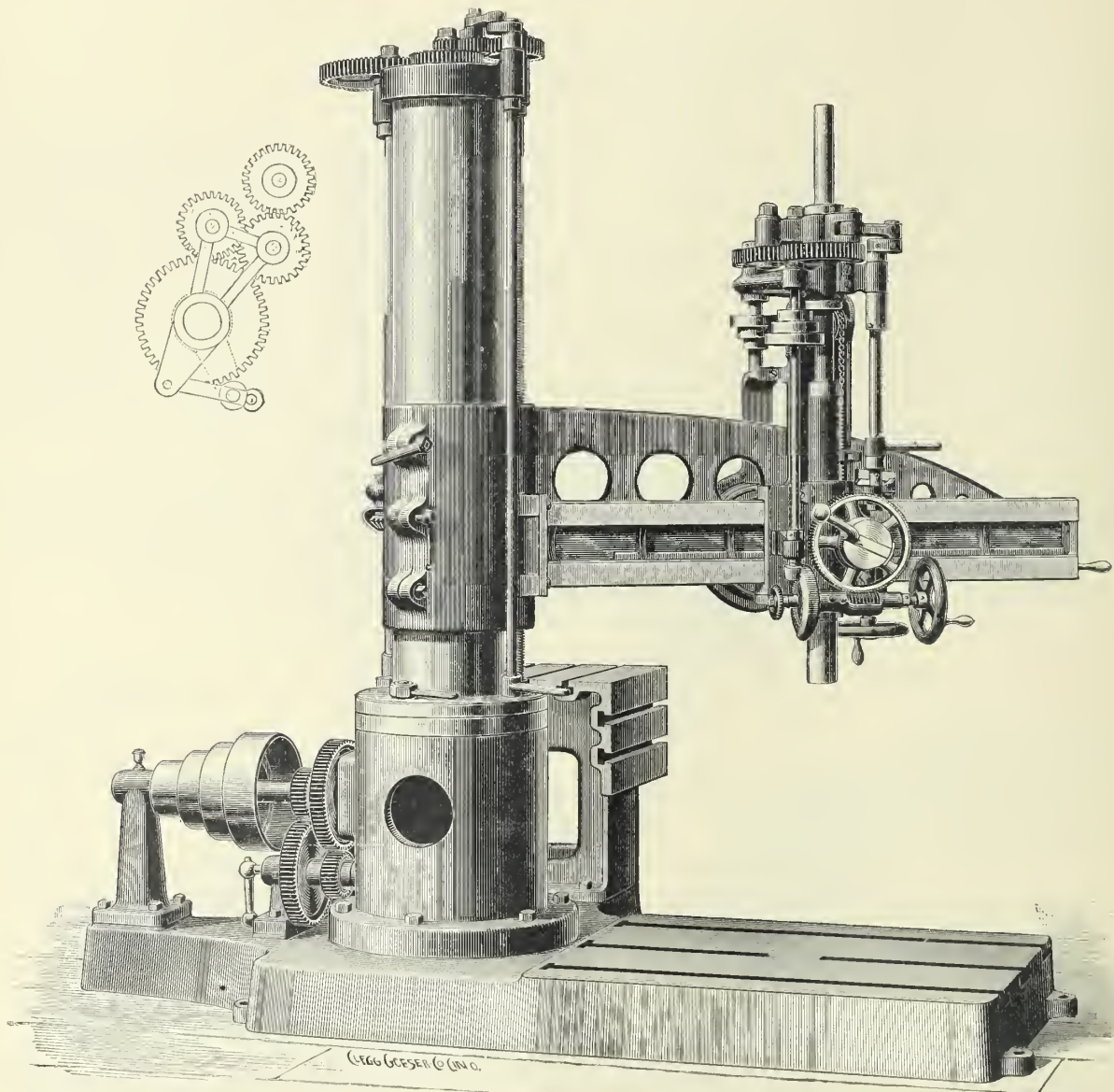
In this style of Drill the head can be swiveled at any angle upon the arm.

SPECIFICATIONS.

	Style A.	Style D.
Diameter of column, - - - - -	11 inches	14 inches
Total height of machine, - - - - -	8 feet 2 inches	10 feet
Distance from elevating screw to center of drill spindle when at the extreme point of arm, - - - - -	5 feet	5 feet 6 inches
Drills to the center of a circle of - - - - -	10 feet	11 feet
Vertical range of arm on column, - - - - -	2 feet 10 inches	4 feet
Receives under spindle, over base, - - - - -	4 feet 10 inches	6 feet 8 inches
Receives under spindle, over floor, - - - - -	5 feet 5 inches	7 feet 4 inches
Height of table from base, - - - - -	2 feet	2 feet 4 inches
Size of table, - - - - -	20 x 20 inches	28 x 28 inches
Spindle bored to fit Morse taper - - - - -	No. 4	No. 5
Diameter of spindle, - - - - -	2 7-16 inches	2 13-16 inches
Traverse of spindle, - - - - -	16 inches	20 inches
Size of tight and loose pulleys, - - - - -	14 x 3 1/2 inches	16 x 3 1/2 inches
Speed of countershaft, - - - - -	250 revolutions	200 revolutions
Width of belt for cone pulley, - - - - -	3 inches	3 inches
Floor space for base, - - - - -	4 feet 8 inches x 8 feet	6 feet 10 ins. x 9 feet 8 ins.
Weight of drill, about - - - - -	5700 pounds	11000 pounds

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FIG. 280.



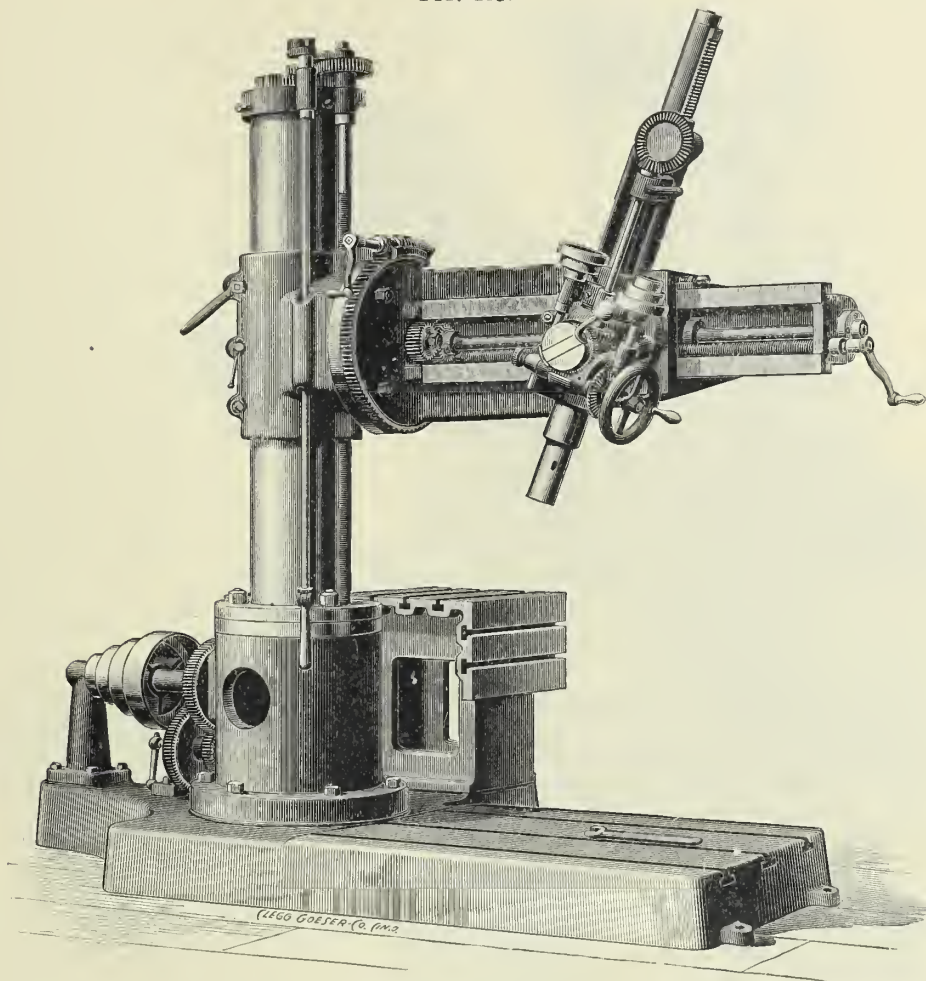
Nos. 1, 2 and 3 RADIAL DRILLS, WITH PATENT TAPPING ATTACHMENT.

THE above cut illustrates Nos. 1, 2 and 3 Radial Drills, with New and Improved Patented Tapping Attachment. This arrangement for tapping is acknowledged by users to be, without any exception, the best in use to-day. The tap will be started by pressing the same with the quick return lever against the work, and the drill spindle is drawn downward until the adjusting clamp on the spindle rack strikes the reverse lever, and thereby the other end of this lever is thrown out of the notch in bottom bracket of reverse shaft.

By means of a spring on the top end of the reverse rod, and also by the departing intention of the engaged spur wheels, the tumbler plate will instantly swing around, and the now engaged wheels reverse the spindle and back out the tap. This will show an entirely automatic movement in all respects, after once throwing the reverse lever back in its notch and starting the tap as described. The spur wheels on tapping radials are cut from solid machinery steel and the mitre gears from solid cast steel. We fully guarantee this arrangement in every particular and will be pleased to send any other information on application.

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FIG. 281.

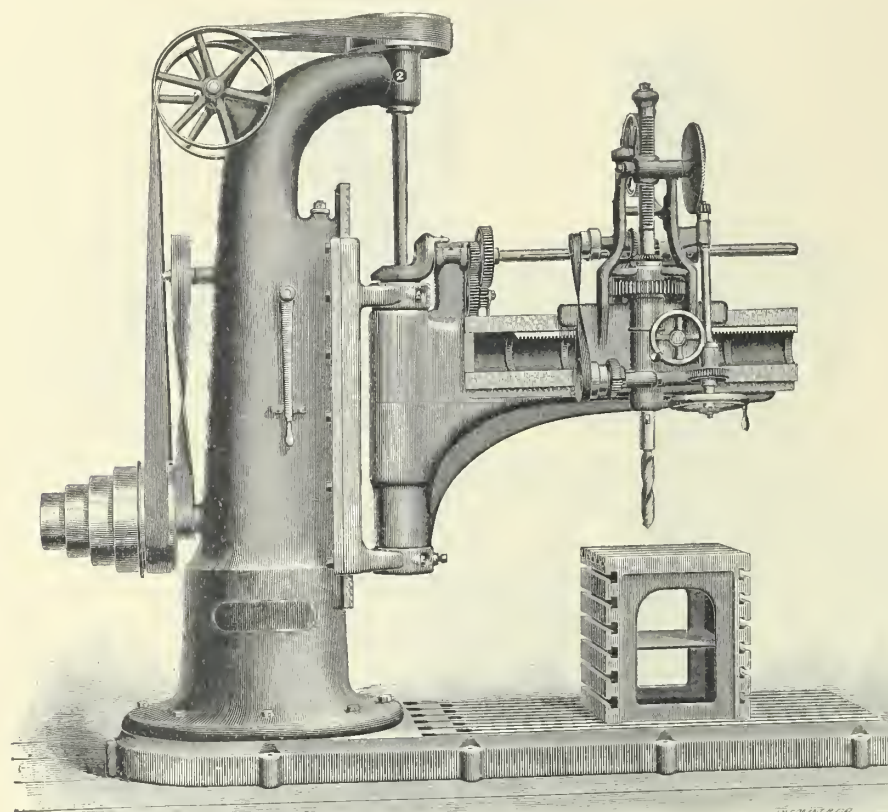


STYLES B AND C. FULL UNIVERSAL RADIAL DRILLS.

SPECIFICATIONS.			
	Style B.	Style C.	
Diameter of column,	11 inches	14 inches	
Total height of machine,	8 feet 2 inches	10 feet	
Distance from elevating screw to center of drill spindle when at the extreme point of arm,	4 feet 6 inches	5 feet 6 inches	
Drills to the center of a circle of	9 feet	11 feet	
Vertical range of arm on column,	2 feet 10 inches	4 feet	
Receives under spindle, over base,	4 feet 10 inches	6 feet 6 inches	
Receives under spindle, over floor,	5 feet 5 inches	7 feet 2 inches	
Height of table above base,	2 feet	2 feet 4 inches	
Size of table,	20 x 20 inches	28 x 28 inches	
Spindle bored to fit Morse taper	No. 4	No. 5	
Diameter of spindle,	2 $\frac{7}{8}$ inches	2 $\frac{13}{8}$ inches	
Traverse of spindle,	16 inches	20 inches	
Size of tight and loose pulleys,	14 x 3 $\frac{1}{2}$ inches	16 x 3 $\frac{1}{2}$ inches	
Speed of countershaft,	250 revolutions	200 revolutions	
Width of belt for cone pulley,	3 inches	3 inches	
Floor space for base,	4 feet 8 inches x 8 feet	6 ft. 10 in. x 9 ft. 8 in.	
Weight of drill, about	5700 pounds	11000 pounds	

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FIG. 282.



6' FOOT RADIAL DRILL.

DISTANCE, from face of column to end of arm, 6 feet $2\frac{1}{2}$ inches. From center of arm trunnions to center of drilling spindle, 5 feet, are double geared, and driven by 4-inch belting on cone of four changes. Idlers run on eccentrics, arranged to tighten belt without stopping machine.

Thrust of lifting screw is received on an anti-friction, hardened steel, ball bearing. Arm has a vertical traverse of 36 inches; is operated vertically by power. Drilling head has a quick lateral adjustment by rack and pinion, also a radial traverse on arm of 42 inches, is provided with a friction hold-fast, which locks saddle to arm, and prevents jumping or any possible change of center while drilling or boring.

Spindle is $2\frac{3}{8}$ inches diameter, with a range of 16 inches; is counterbalanced, and has quick return by rack and pinion, *which is always in gear*; has hand and automatic feed of six changes (three for drilling and three for boring).

Machine is provided with hold-fast, which secures the arm in position when spindle is used for boring purposes. Greatest height between spindle and floor, 6 feet 5 inches.

Portable drilling table is accurately planed on all sides, and provision made for bolting same to base; has T slots on top and sides; also vertical V groove for holding square or cylindrical work; is also provided with shelf and receptacles for tools. Top of table is 22 x 24 inches; sides, 22 x 25 inches.

Base plate is 9 feet 8 inches long, 44 inches wide, $6\frac{1}{2}$ inches thick, and extra heavy; has anchor holes for foundation bolts, T slots, guide hole for boring bars, and is accurately planed top and bottom.

Furnished with countershaft, wrenches, socket key, and a set of steel drill sockets for Morse standard taper drills.

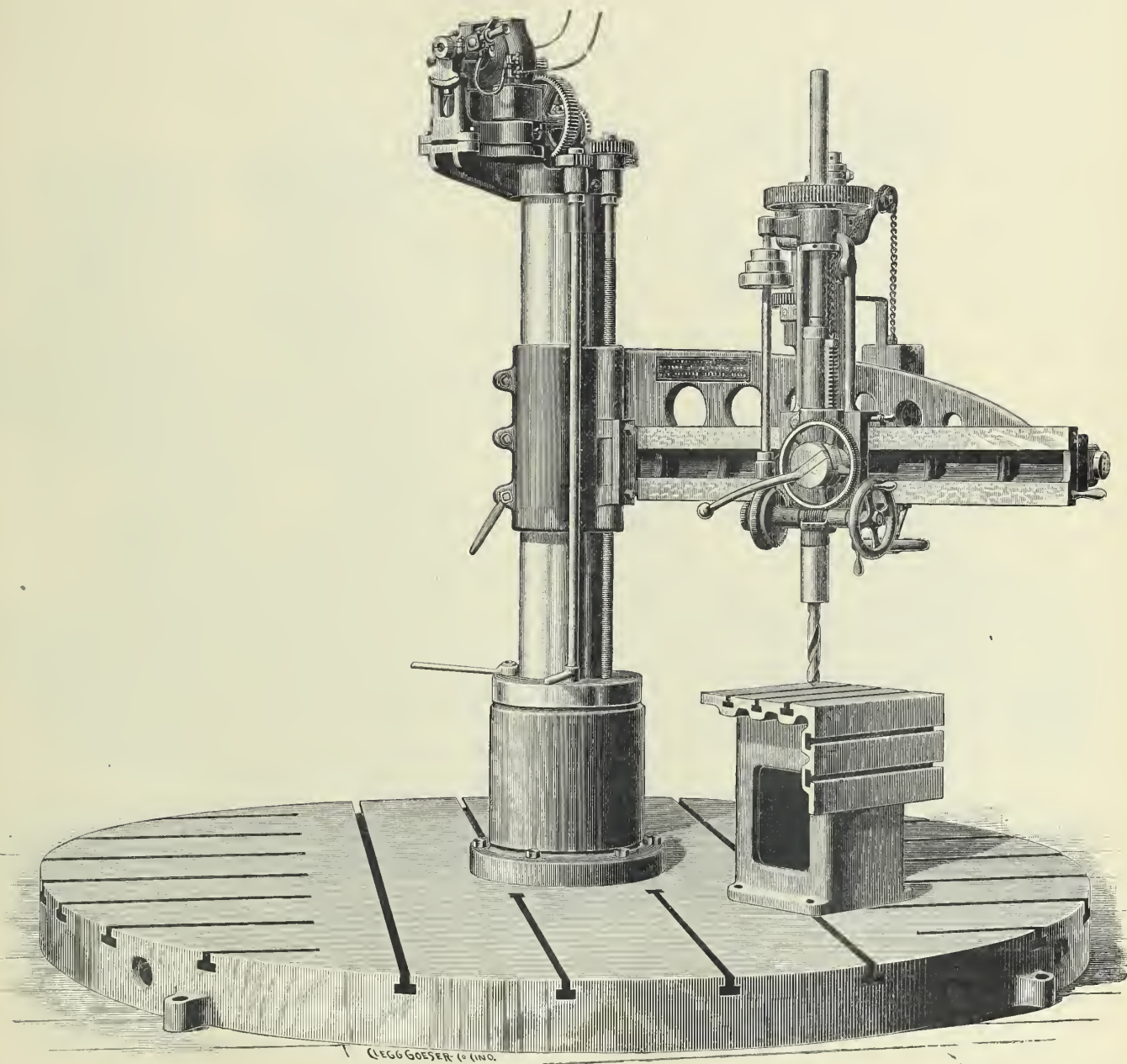
Weight, 10850 pounds.

Tight and loose pulleys on countershaft, 16 inches diameter, 6 inch face.

Countershaft should make 100 revolutions per minute.

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FIG. 283.



RADIAL DRILL, DRIVEN BY ELECTRIC MOTOR.

General description on page 286.



RADIAL DRILL.—(Fig. 283.)

DRIVEN DIRECT BY ELECTRIC MOTOR.

THE illustration shows our Radial Drill, driven direct by an electric motor. The motor is fastened to the top cap of the drill column, and its armature shaft is fitted on one end with a raw-hide pinion which is engaged with a spur wheel which is at one end of a short shaft, which shaft carries at the other end a steel mitre wheel. This mitre wheel engages with a small wheel on the upper end of the vertical splined shaft in the back of the column. From this shaft the power is transmitted to the horizontal splined shaft in back of the arm, and from here to a short vertical shaft in the back of the head which drives the spindle direct. The gearing on this machine is attached directly to the spindle, which arrangement greatly reduces the strain on the shafts. The arm of the Drill swings completely around in a full circle, and the base of this machine is also made in a full circle, which gives the great advantage of setting the work on one part of the base while another piece is being drilled.

The remainder of the machine is similar in construction to our regular line of Drills described in the previous pages. The entire arrangement of this Drill, fitted with electric driving power, has been very satisfactory, and we can recommend it in every respect. Further particulars in reference to such a machine will be sent on application.

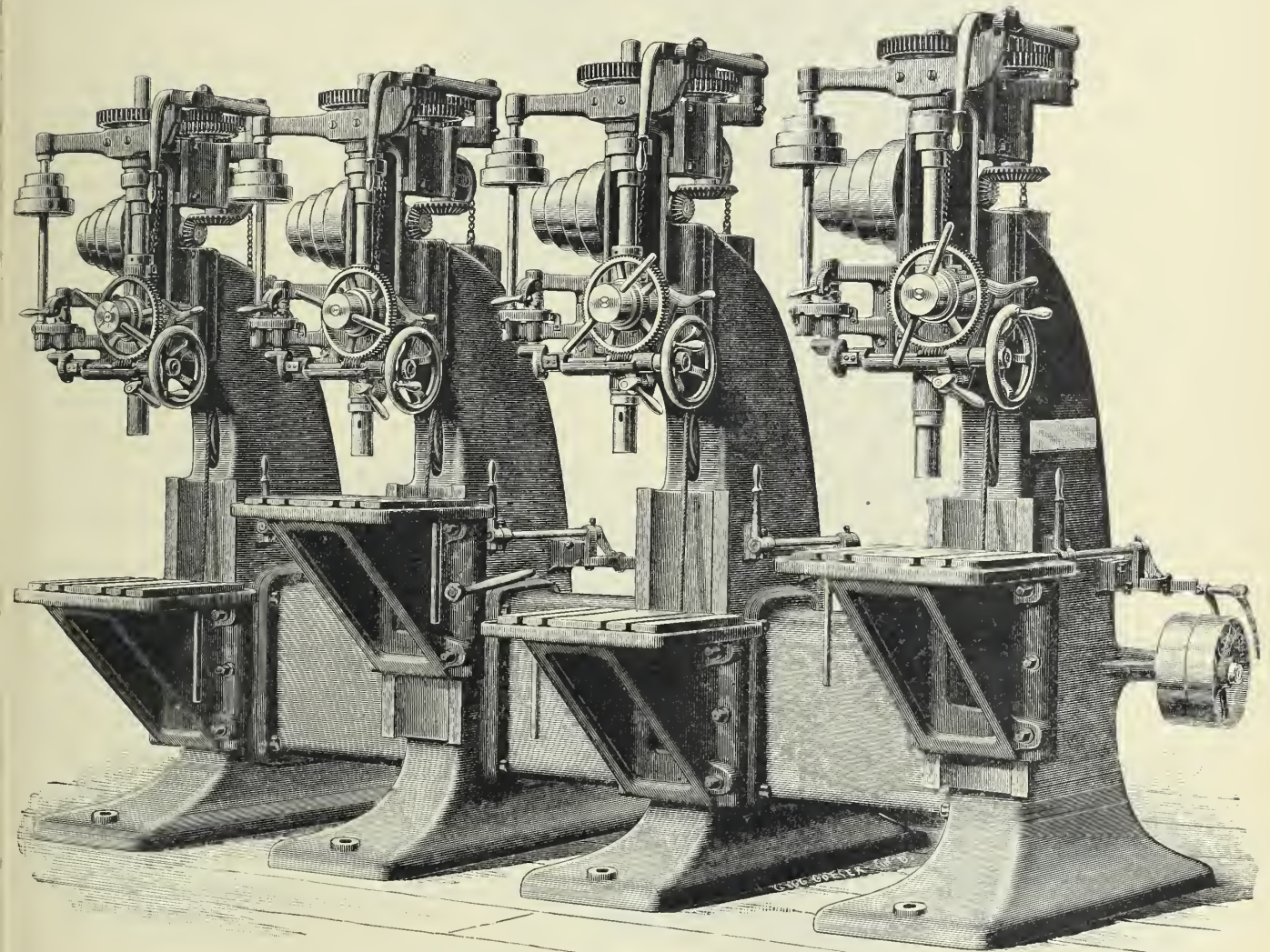
SPECIAL MULTIPLE DRILL.—(Fig. 284.)

THE cut shown represents a Special Multiple Drill designed for drilling, reaming, and counterboring a large variety of work. In designing the machine we have taken into consideration two points as the main features, great strength and very rapid operation. The machine is constructed very rigid, and the columns are bolted together with box, girder-shaped, connecting pieces. The outer sides of outside columns are provided with planing strips and tapped holes, ready for fastening additional machines in the same gang. The countershafts are placed on the bottom of columns, and shifting of driving belts is done quickly, as the shifting handles are in the nearest reach of the operator. The belts on the cone pulleys can be attended to with the greatest facilities. The arrangement and the direction of the countershaft cones, the displacement and setting of machines is very simple, as it is necessary only to have it parallel to or under the line shaft, and to run the belts from the same down direct to the countershaft pulleys. The table heads on the columns are counterbalanced by a weight inside of the housing, and can be adjusted within a range of 10 inches vertically by hand. Three bolts and clamping gibs secure them tightly to the column. The table is also provided with an annular groove to take up the oil or other lubricating liquid conveyed to the drills by means of a centrifugal pump attached to the machine. At the deepest corners of this groove the drain pipe is inserted, to which an easy connection can be made to the supply basin for pump. In reference to the head, this and all the parts movable or stationary are constructed for the performance of very rapid and large work. The machines are made with back gears, as shown in the cut, or without back gears, for the lighter class of work. The spindles are $2\frac{1}{8}$ inches diameter, and on the back-gear machine can be run with eight different speeds, four with and four without back gears. On the plain-gear machine we have five different speeds from the cone pulleys. The back gears can be thrown in or out instantly while the machine is running. The gearing ratio from cone-shaft to spindle on the back-gear machines is 1 to 12, and on the plain-gear machines 1 to 4. The spindles have three different feeds, and by using a very large worm-wheel and wide feed pulleys, large intermediate gears, the largest efficiency is produced. The spindles are counterweighted, and have anti-friction ball thrust bearings between spindle-collar and sleeve. The feed mechanism is the simplest on the market, and combines quick return, automatic stop, power feed and hand feed, all of which are very clearly shown in the cut. The swiveling worm-shaft and worm are kept engaged with the worm-wheel by means of the eccentric lever near the hand feed, and are locked by the automatic trip lever. The vertical range of spindles is 8 inches. Cones for $2\frac{1}{2}$ inch belt. The distance of column from center to center is 3 feet, giving ample room for the operator.

Further detail, together with prices, may be had on application.

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FIG. 284.



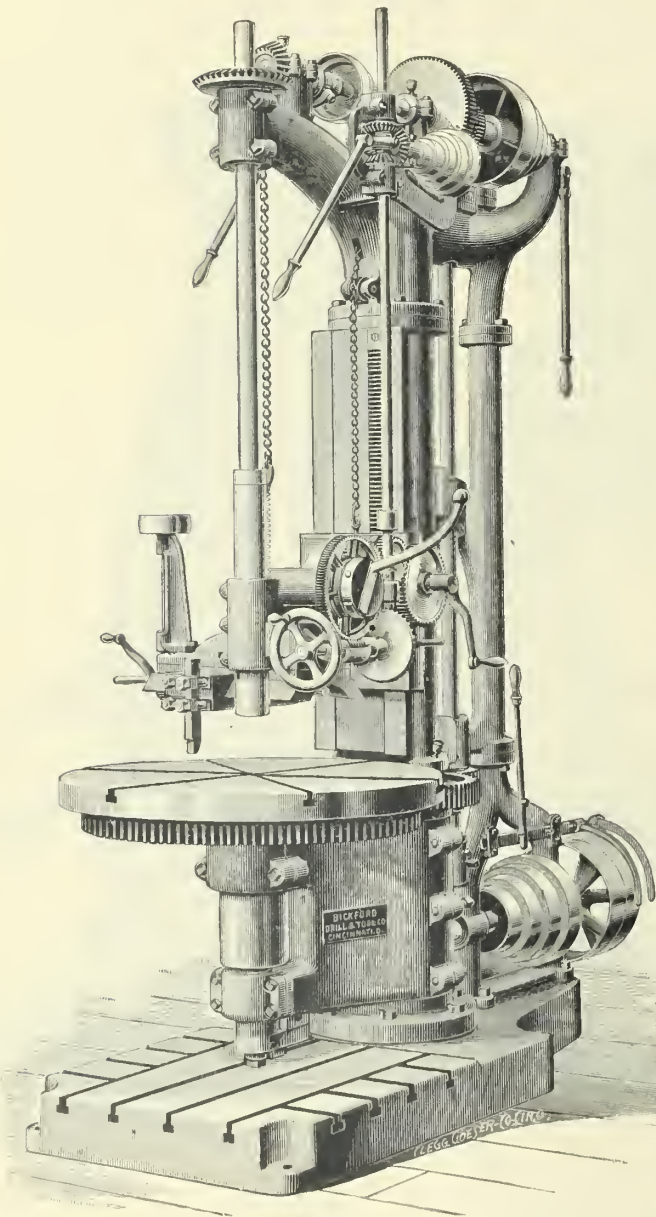
SPECIAL MULTIPLE DRILL.

General description on page 286.

PRENTISS TOOL & SUPPLY CO.

40 INCH BORING AND TURNING MILL.

FIG. 285.



THE accompanying illustration shows a 40 inch boring and turning mill, in combination with a 40 inch up-right drill of our latest design.

The machine in all its parts is constructed for durability and convenience of handling, and many new features and improvements.

The table, or rather its strong spindle, revolves in two long bearings of the swinging arm, and in addition is supported by a foot bearing, which is fastened rigidly to the base. A hardened steel toe is inserted in the end of the spindle, which toe finds its support on a hardened steel-plate, which is always submerged in oil. This plate can be raised or lowered by means of a screw, according to the desired speed of the revolving table.

The table, with its supporting arm, can easily be swung around the column on anti-friction rollers, which are in an annular groove at the bottom of the arm, and by fastening the foot-bearing to the base-plate, it brings the center line of the table-spindle exactly central with the drill-spindle, and no setting or adjusting is required. The table is indirectly driven from the top shaft of the machinery by means of a steel mitre-wheel, which matches into a mitre-wheel on the vertical shaft between column and back brace. At the end of this shaft, which can be raised or lowered to bring the mitres out or into match, is a spur-pinion, which drives, by means of the column surrounding intermediate wheel, the spurring of the table.

By the peculiar appliance and combination of the gearing on the top shaft, the spindle and the table can revolve together, thus giving the machine the qualification of a double-head boring and turning mill.

The strong and heavy front arm slides on the V-shaped face of the column very easily. It has long gibbed bearings, and can be raised or lowered either direct by crank handle or worm and worm-wheel, and the same hand wheel which serves for feeding the drill spindle by hand. It can also be fed up and down by power, same as the spindle, without much change in the feed mechanism, by throwing in an intermediate gear on an oscillating lever.

The front arm has on the left side a strongly braced extension, which carries the carriage and tool-holder. The carriage can be fed automatically or by hand from the right to the left, or *vice versa*, same as on any ordinary turning mill.

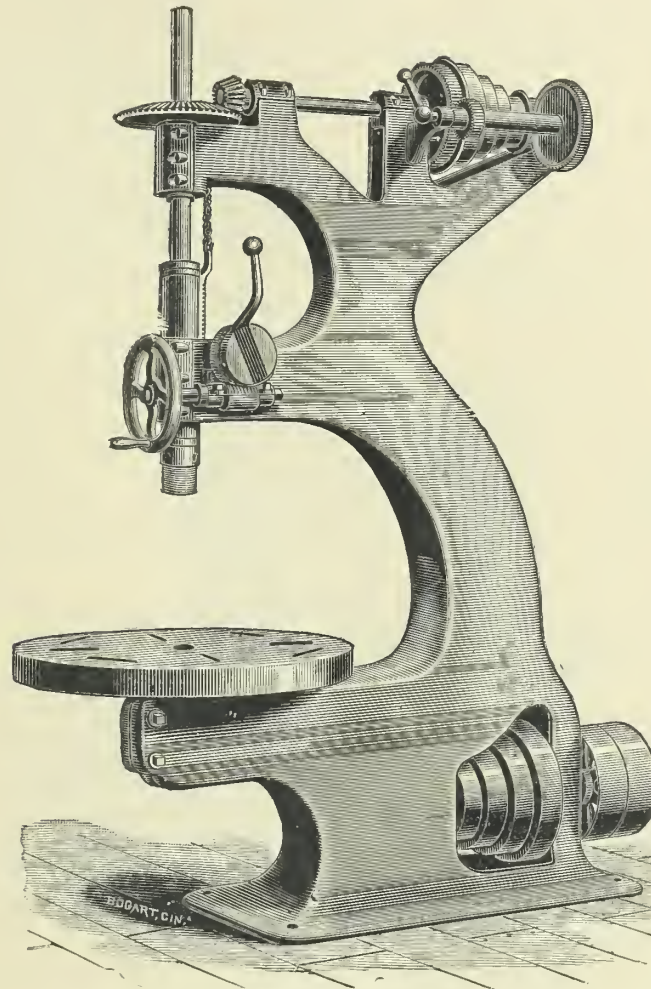
There are five different feeds for turning, as well as for drilling or boring, and eight different speeds for the rotation of table and spindle. The front arm or head and spindle

are counterbalanced by chain and weight. All handles for changing feeds or speeds of the machine are in convenient reach. The spindle-shafts and studs, likewise the main gearing, are made of steel.

In all details the machine is perfectly correct, consequently the manufacturers give the strongest guarantee for the efficiency of the tool.

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FIG. 286.



60 INCH BOILERMAKERS' DRILL.

THE above illustration represents our 60 inch Boilermakers' Drill. It is especially adapted to boiler work, is well proportioned, with great strength and accuracy of working parts.

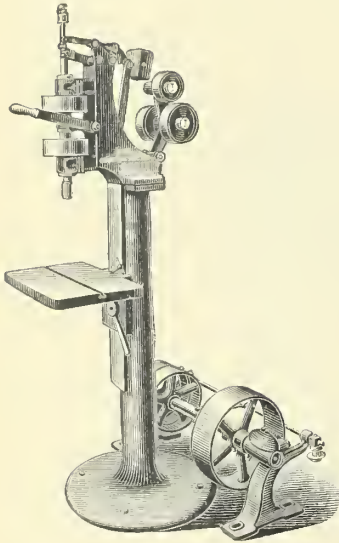
It has all modern improvements, has wheel feed and our patent quick return motion of the spindle. An extra tool arm is furnished with each drill, to screw on end of spindle for cutting holes up to 18 inches in diameter, such as tube and flue holes in boiler heads, etc.

The spindle is made of steel, counterbalanced by weight in column. Height of drill is 7 feet 8 inches. Swing 60 inches. The table is 36 inches in diameter. The distance from table to end of spindle is 18 inches. The latter is $2\frac{7}{8}$ inches in diameter, and has 14 inch feed. The bevel gear is 14 inches in diameter. Pinion runs three to one. Cone pulleys have four changes, 6, 8, 10, 12 inches in diameter. The tight and loose pulleys are 12 inches in diameter, all for $2\frac{1}{2}$ inch belt, and should run 200 revolutions.

This Drill can be made with back gear, or back gear and power feed, as desired. Weight, 3500 pounds.

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FIG. 287.



No. 1 AUTOMATIC TAPPING MACHINE.

THE spindle is fitted with two loose friction pulleys, driven in opposite directions by one continuous belt. Between these pulleys is a friction clutch keyed to the shaft, which is thrown into the driving pulley by the downward pressure of a hand lever at the right. The tapping then proceeds, and is tripped and reversed automatically at any point in the operation by an adjustable stop on the upper end of the spindle, coming into contact with a reversing lever at the top of the machine, or by moving this lever by hand. The spindle is balanced and fitted with a chuck for holding the taps. The table is rectangular, has an oil groove around it, and is adjustable up and down the column to suit the work. A valuable feature in this tool is that it operates satisfactorily at high speed and will trip and reverse after being set, though the operator should continue to press down the starting lever.

SPECIFICATIONS.

Diameter of spindle,	- - - - -	1 inch
Diameter of the largest hole that can be tapped,	- - - - -	$\frac{5}{16}$ inch
Motion of spindle,	- - - - -	$2\frac{1}{2}$ inches
Dimensions of table,	- - - - -	12 x 18 inches
Adjustment of table on column,	- - - - -	20 inches
Tight and loose pulleys on countershaft,	- - - - -	6 x $2\frac{1}{2}$ inches
Speed of countershaft,	- - - - -	200 revolutions
Net weight complete,	- - - - -	300 pounds

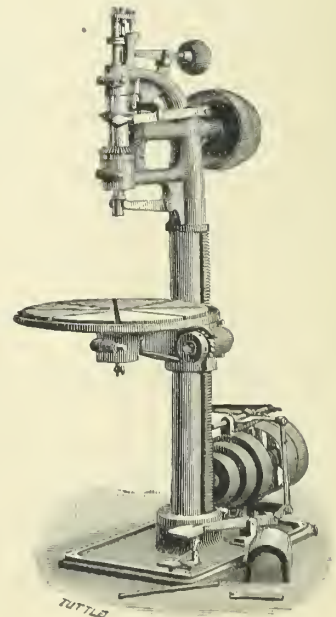
No. 2 AUTOMATIC TAPPING MACHINE.

THIS machine is adapted for tapping holes rapidly, squarely, and to a uniform depth in work of any size, large or small. The driving clutch is thrown into gear and the tap started by the lever shown on the side of the machine, when the tapping proceeds, trips and reverses automatically. When the stop is not set the catch on the top of the machine is readily pushed off by hand, or the tap may be stopped instantly by tripping the treadle on the base. The table has T-slots for holding down work, and has an oil groove around the rim with reservoir in the center. The table can turn on its center, and also swing around on the column. The spindle is balanced by a weight inside the column, and is provided with a slip chuck for holding taps below $\frac{1}{4}$ inch. This chuck can be set for different degrees of resistance, and when the tapping becomes greater, from careless drilling, than the tap can safely stand, the chuck will slip around in its spindle and avoid breaking the tap. The driving cone has three steps for $2\frac{1}{2}$ inch belt.

SPECIFICATIONS.

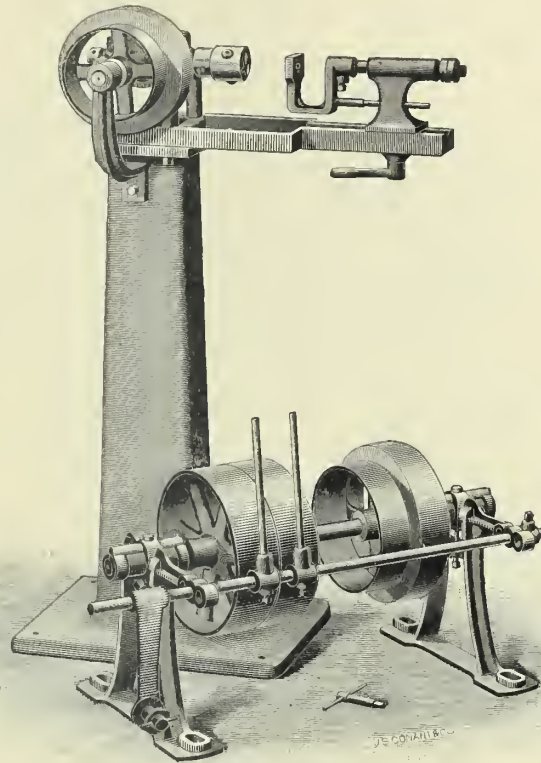
Diameter of spindle,	- - - - -	$1\frac{5}{16}$ inches
Largest size of hole that can be tapped,	- - - - -	$\frac{1}{2}$ inch
Motion of spindle,	- - - - -	4 inches
Diameter of table,	- - - - -	24 inches
Adjustment up and down on column,	- - - - -	28 inches
Tight and loose pulleys,	- - - - -	10 x $3\frac{1}{2}$ inches
Speed of countershaft,	- - - - -	135 revolutions
Weight,	- - - - -	675 pounds

FIG. 288.



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FIG. 289.



IMPROVED TAPPING MACHINE.

THIS machine is designed for manufacturers of sewing machines, fire arms, electric lamps, locks, hardware and bicycles. It is self-reversing by pressing the work against the tap, and drawing it in the opposite direction when finished; the check nuts on the end of the spindle govern the depth to be tapped, when the tap is not required to pass through.

The clutch is operated by gears running in opposite directions.

It is run by one belt, the cone pulley having two changes of speed.

A universal chuck holding from 0 to $\frac{1}{2}$ inch is a part of the machine.

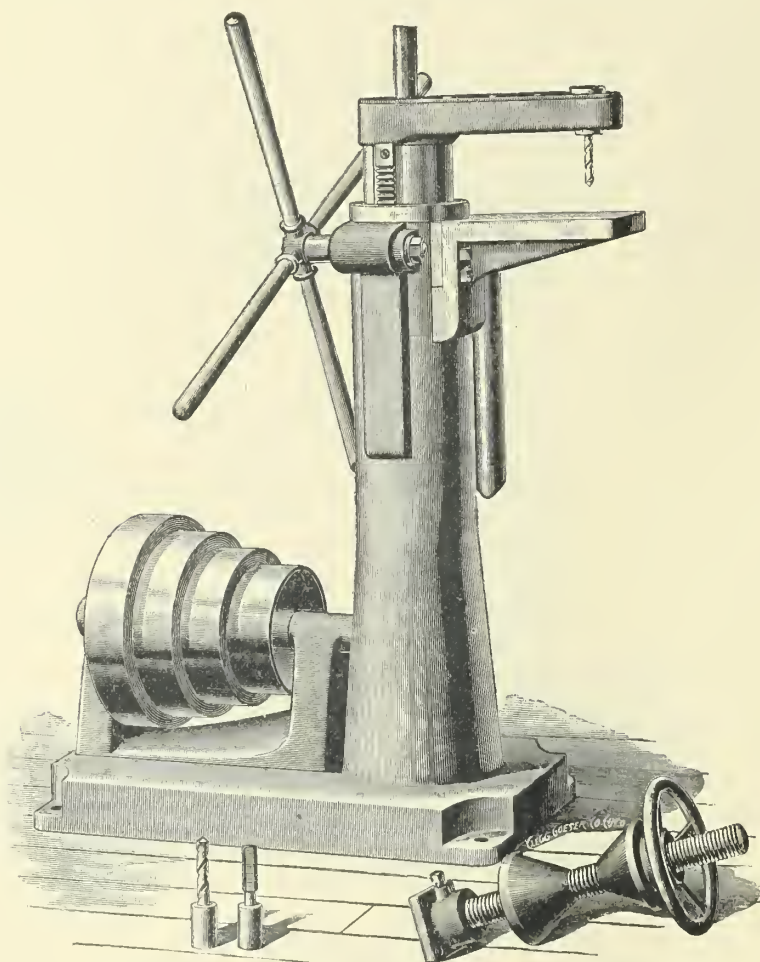
It can be used for drilling by attaching a lever to the foot block spindle; the clutch held from reversing by a stop on the back of machine.

Drilling attachment furnished when desired.

Tight and loose pulleys, 10 x $2\frac{1}{2}$. Speed of countershaft, 140 revolutions.

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FIG 290.



PULLEY DRILLING AND TAPPING MACHINE.

General Description.

THIS machine is designed for the use of such shops as have a great many pulleys, fly wheels or other work requiring set screws. It is intended to be set at the edge of a pit, and will then drill and tap pulleys from 12 inches in diameter by 20 inch face, to a diameter of the limit of the pit by 20 inch face.

The small pulleys can be handled to advantage where the number of arms will permit it. Three detachable arbors for holding the work are furnished with each machine; the smallest size being like the one shown in the foreground.

The drills and taps are driven through a train of gears by the upright shaft shown, which is driven in its turn by a pair of steel bevel gears at the base of the machine.

The pilot-wheel governs the feed, the sliding head being balanced so as to be extremely sensitive. The sleeve is bored taper to receive the bushings shown, said bushings being splined on the outside along their length, and squared at the upper end to receive ordinary machinists' hand-taps.

The drill-holders have also a slot to receive the flatted end of the drill.

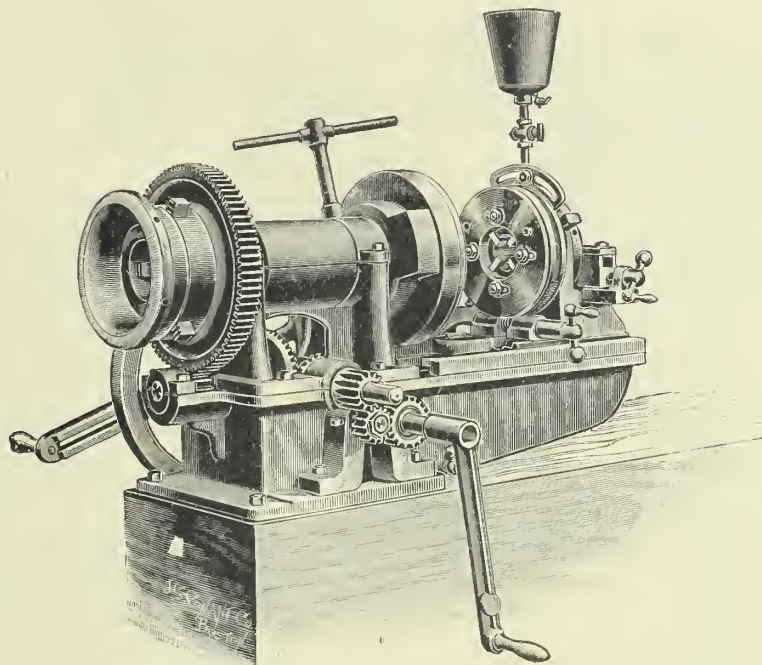
In addition to this, small set screws are used to hold the drills and taps up into place. A full set of these tools furnished with each machine, consisting of $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$ and 1 inch.

A friction countershaft, with reverse motion, is also furnished for overhead.

The weight of the machine is 800 pounds.

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FIG. 291.



BENCH PIPE MACHINES.

QUICK OPENING, ADJUSTABLE DIES.

A LIGHT, strong, portable machine, and very powerfully geared, so that the largest sizes of pipe are threaded with ease. The combination of changes in speed are quickly effected by simply changing position of gears as shown in cut.

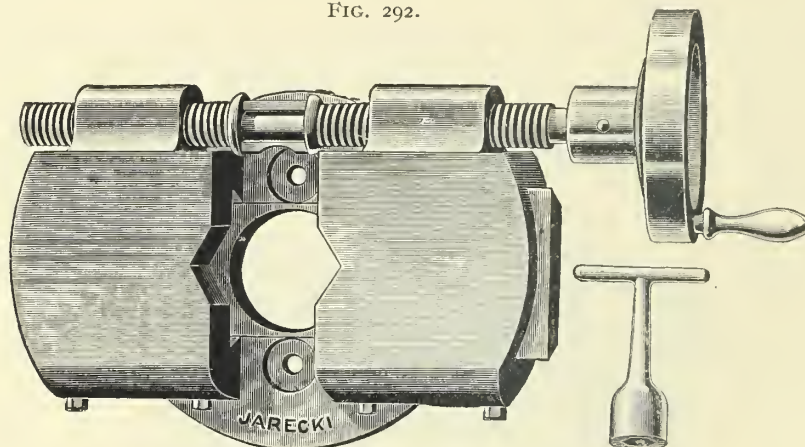
No. 30 threads and cuts $\frac{1}{4}$ to 2,	-	-	-	\$60.00	Extra dies, per set of 4 pieces, right or left,	-	-	\$2.50
" 31 " " " $\frac{1}{4}$ to 3,	-	-	-	150.00	" " 4 " " " "	-	-	3.50
" 32 " " " 1 to 4,	-	-	-	200.00	" " 4 " " " "	-	-	4.00
" 33 " " " $1\frac{1}{2}$ to 6,	-	-	-	300.00	" " 4 " " " "	-	-	4.50
" 34 " " " $2\frac{1}{2}$ to 8,	-	-	-	450.00	" " 6 " " " "	-	-	7.00

The dies are quick opening and adjustable. Each set of four or six pieces up to five inches cuts two sizes of pipe, which is a great point in favor of the machine when new dies are required.

After pipe is threaded there is no backing off the dies as in the ordinary manner. All that is necessary is simply to open the dies and move pipe away from dies. If pipe is to be cut off the dies will expand far enough to admit of pipe passing through them to the cutting-off knife. When dies require sharpening they can be quickly removed and ground on any ordinary grindstone. The die head is also provided with an adjustable stop pin which is very convenient when a large number of threads of the same size are to be cut. Ordinarily, every time a thread is cut, the dies must be carefully reset. With this adjustable stop the dies are first set to the size to be threaded, then the adjustable stop moved and secured, which will only allow the cam to move to the point required to thread the proper size without the necessity of carefully resetting for every thread that is to be cut.

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FIG. 292.

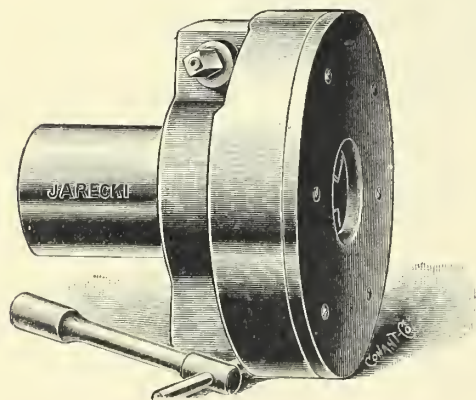


NUT GRIPPING CHUCK.

Remove die head cover and dies and attach nut gripping chuck.

Price for No. 6 or 7 Machine, to take square or hexagon nuts, $\frac{3}{8}$ to $1\frac{1}{2}$ inch,	-	-	-	\$20.00
" for No. 7A to 12 Machines, to take square or hexagon nuts, $\frac{1}{2}$ to 2 inches,	-	-	-	25.00
" for Wrench,	-	-	-	.50

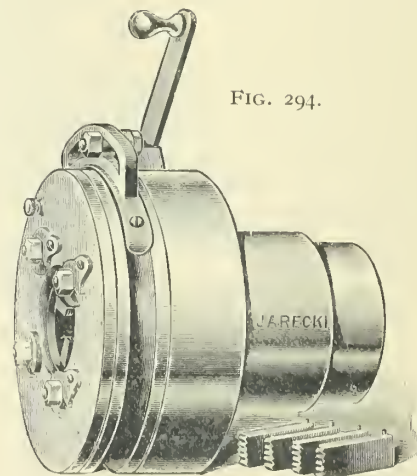
FIG. 293.



CHUCK.

The spindle of this Chuck can be inserted into gripping chuck of Nos. 8 to 12 Machines, inclusive, and will grip $\frac{3}{8}$ to 2 inch rods and $\frac{1}{4}$ to 2 inch pipe, inclusive.

FIG. 294.



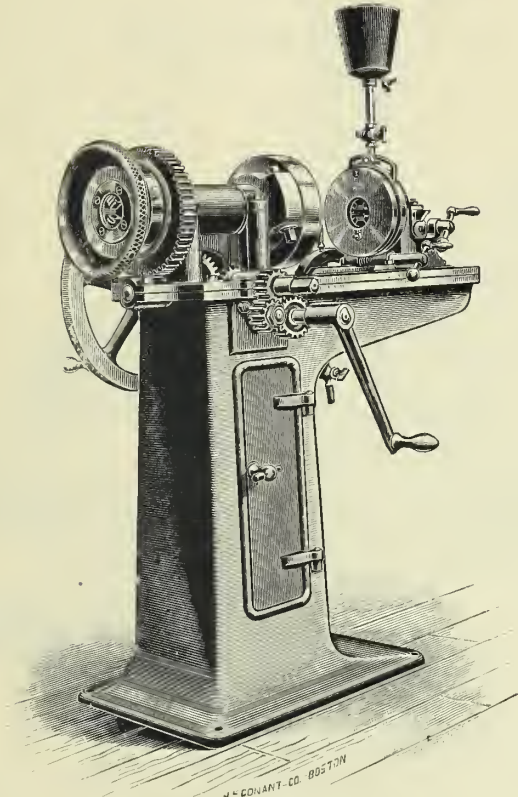
DIE HEAD.

The spindle of this Die Head is so constructed that by removing die head cover and dies from Nos. 8 to 12 Machines, inclusive, it can be inserted and firmly held in position.

Price Chuck, take $\frac{1}{4}$ to 2 inches, including wrench,	-	-	-	Fig. 293,	\$25.00
" Die Head, with $\frac{3}{8}$ to 2 inch bolt dies, inclusive,	-	-	-	" 294,	60.00
" Die Head, with $\frac{1}{4}$ to 2 inch pipe dies, inclusive,	-	-	-	" 294,	50.00
" Extra bolt or pipe dies, per set of four pieces,	-	-	-	-	3.50

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FIG. 295.



No. 6 PIPE MACHINE.

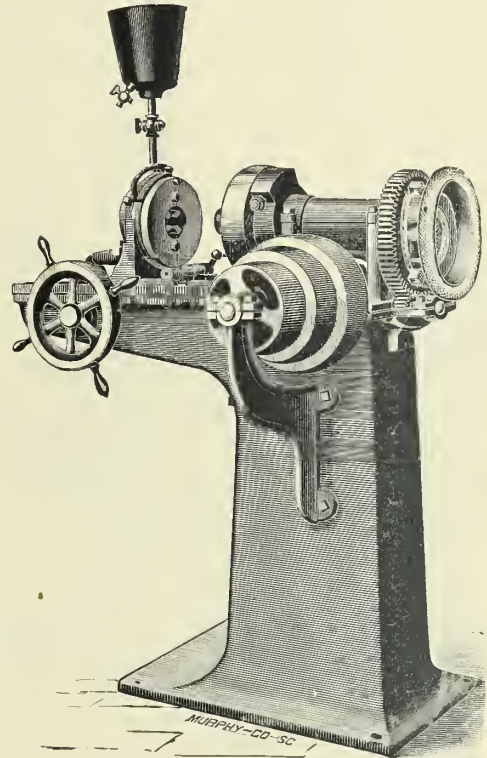
$\frac{1}{4}$ TO 2 INCH QUICK OPENING, ADJUSTABLE DIES.

Weight, about 660 pounds.

Floor space, 2 feet 4 inches x 4 feet.

Lubricate dies with lard oil.

FIG. 296.



No. 7 PIPE MACHINE.

$\frac{1}{4}$ TO 2 INCH QUICK OPENING, ADJUSTABLE DIES.

Speed of countershaft, 200 revolutions.

Diameter of pulleys, one tight and two loose, 12 inches for 3 inch belt.

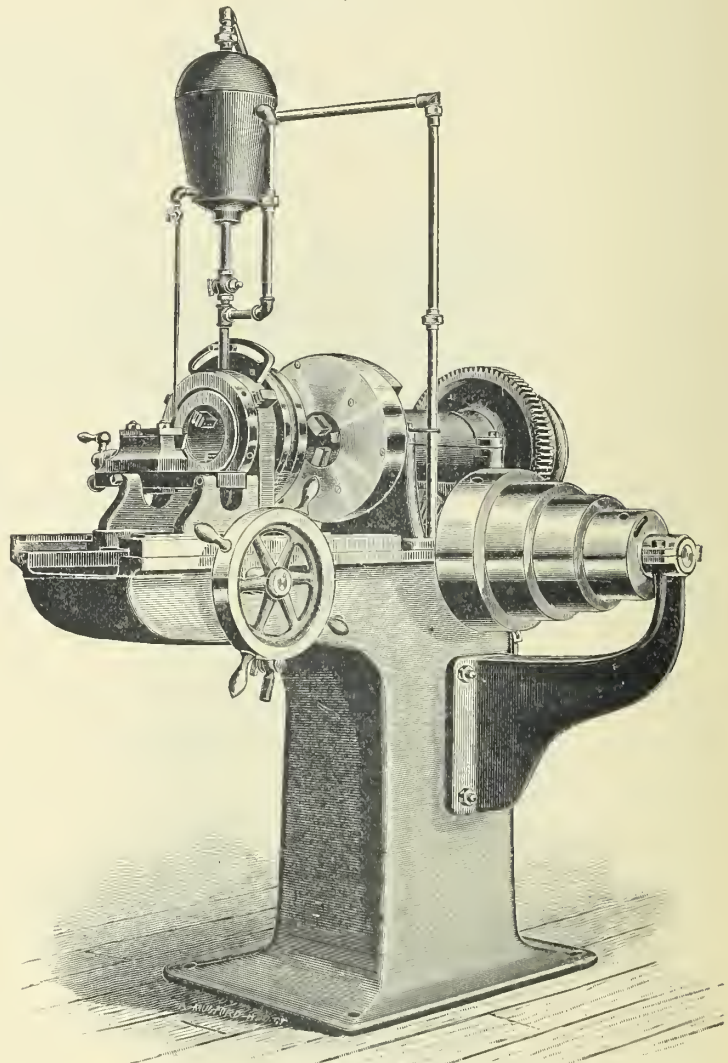
Cone has 3 steps for 3 inch belt.

Price No. 6 Machine, including right hand dies, $\frac{1}{4}$ to 2 inches,	-	-	-	-	-	-	-	-	\$90.00
" No. 7 Machine, including right hand dies, $\frac{1}{4}$ to 2 inches, and countershaft,	-	-	-	-	-	-	-	-	105.00
" Oil pump, extra,	-	-	-	-	-	-	-	-	15.00
" Cutting-off knife,	-	-	-	-	-	-	-	-	.50
" Extra dies, 4 sets of pipe dies, right or left, at \$2.50 per set,	-	-	-	-	-	-	-	-	10.00

One set cuts these two sizes :	One set cuts these two sizes :	One set cuts these two sizes :	One set cuts these two sizes :
$\frac{1}{4}$ and $\frac{3}{8}$.	$\frac{1}{2}$ and $\frac{3}{4}$.	1 and $1\frac{1}{4}$.	$1\frac{1}{2}$ and 2.

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FIG. 298.



No. 7B PIPE MACHINE.

$\frac{1}{4}$ TO 3 INCH QUICK OPENING, ADJUSTABLE DIES.

Speed of countershaft, 200 revolutions.

Diameter of pulleys, one tight and two loose, 14 inch for 4 inch belt.

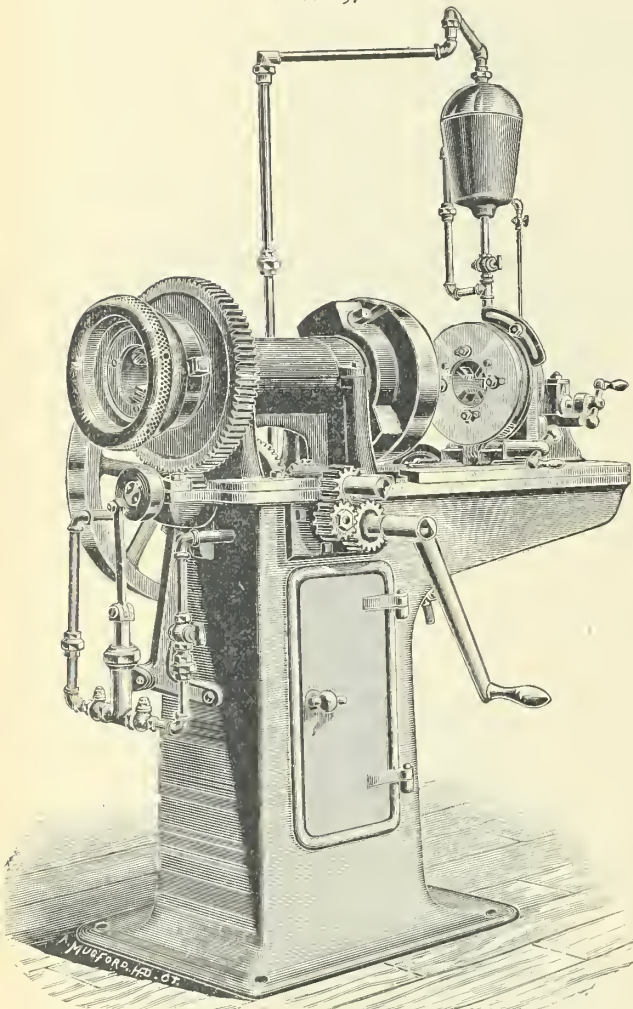
Cone has 4 steps for $3\frac{1}{2}$ inch belt.

Price No. 7A Pipe Machine, including right-hand dies, $\frac{1}{4}$ to 3 inches,	-	-	-	-	-	-	-	-	\$300.00
" No. 7B Pipe Machine, including right-hand dies, $\frac{1}{4}$ to 3 inches, and countershaft	-	-	-	-	-	-	-	-	325.00
" Extra dies, 5 sets pipe dies, right or left, at \$3.50 per set,	-	-	-	-	-	-	-	-	17.50
One set cut these two sizes: One set cut these two sizes: One set cut these two sizes: One set cut these two sizes: One set cut these two sizes:	$\frac{1}{4}$ and $\frac{3}{8}$.	$\frac{1}{2}$ and $\frac{3}{4}$.	1 and $1\frac{1}{4}$.	$1\frac{1}{2}$ and 2.	$2\frac{1}{2}$ and 3.	-	-	-	.50
" Cutting-off knife,	-	-	-	-	-	-	-	-	

Can furnish extra dies for easing and line pipe. Also for English and Whitworth standard threads.

When threading 2 inch and smaller always insert the bushing or die supporter into the die head to stiffen the dies.

FIG. 297.



No. 7A PIPE MACHINE.

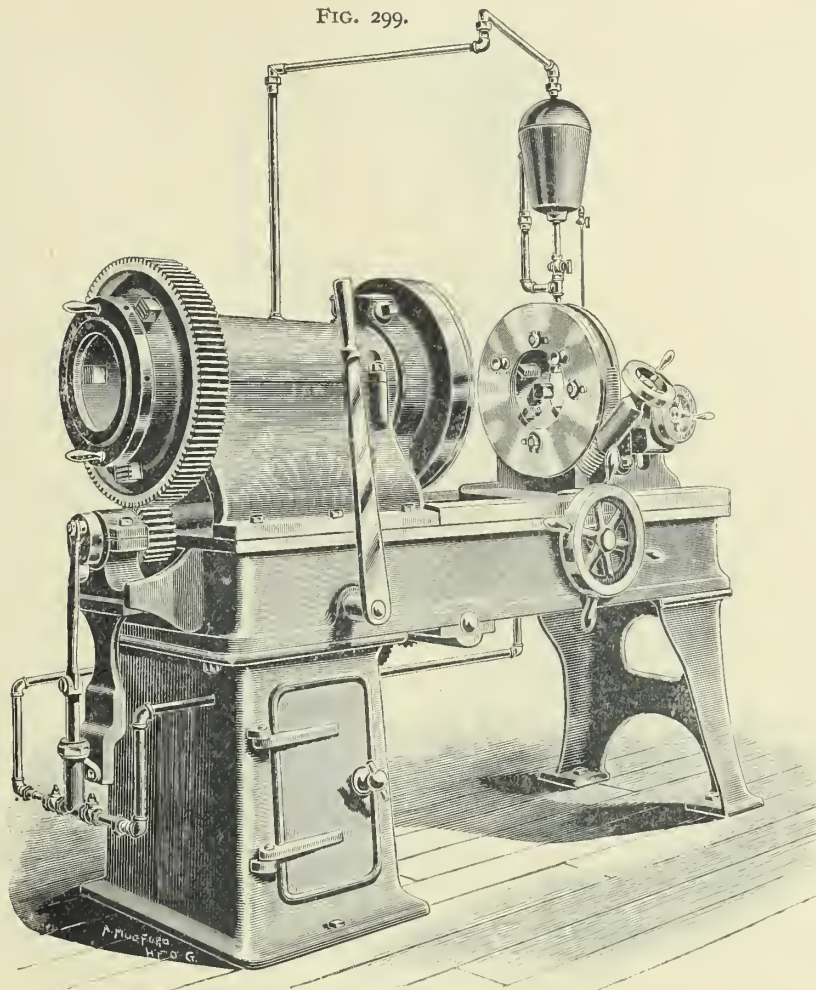
$\frac{1}{4}$ TO 3 INCH QUICK OPENING, ADJUSTABLE DIES.

Weight, about 1000 pounds.

Floor space, 2 feet 8 inches x 4 feet 4 inches.

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FIG. 299.



No. 9 PIPE MACHINE.

1 TO 4 INCHES QUICK OPENING, ADJUSTABLE DIES.

Weight, about 2000 pounds.

Floor space, 3 x 6 feet.

Speed of countershaft, 200 revolutions.

Diameter of pulleys, one tight and two loose, 14 inches for 4 inch belt.

Cone has 3 steps for 3 1/2 inch belt.

When threading 3 inches and smaller always insert the bushing or die supporter into die head to stiffen the dies. This machine has six changes of speed, without removing or replacing gears.

Price, No. 9 Pipe Machine, including right hand dies, 1 to 4 inches, and countershaft - - - - - \$425.00

" Cutting-off knife, - - - - - .70

" Extra dies, 4 sets pipe dies, right or left, at \$4.00 per set, - - - - - 16.00

One set cuts these two sizes :
1 and 1 1/4

One set cuts these two sizes :
1 1/2 and 2.

One set cuts these two sizes :
2 1/2 and 3.

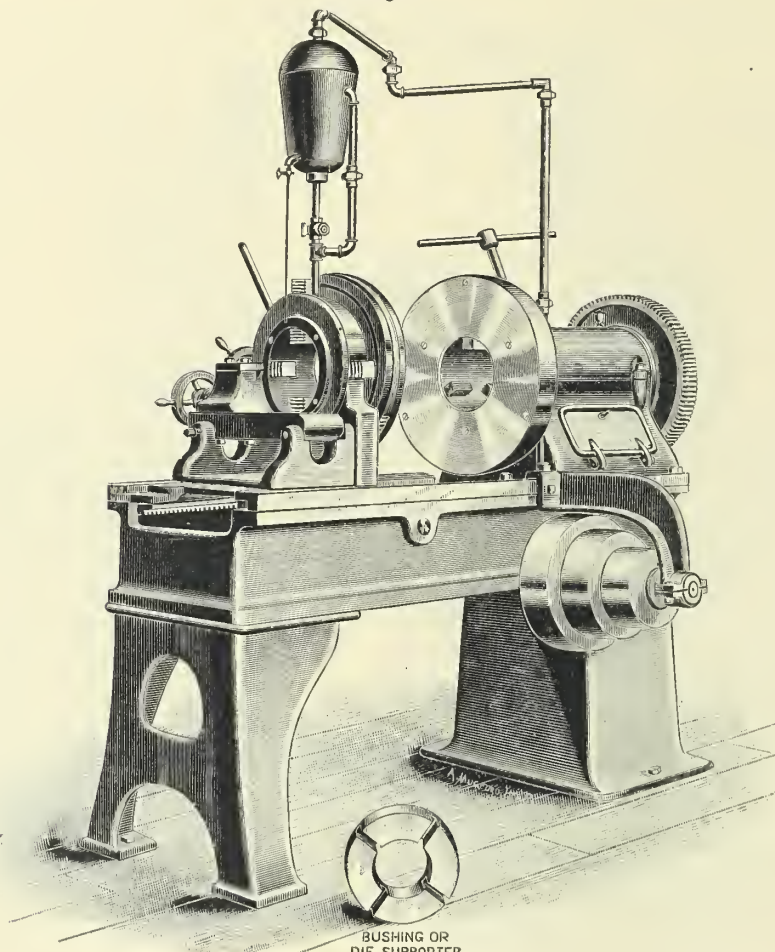
One set cuts these two sizes :
3 1/2 and 4.

Can furnish dies for threading casing and line pipe. Also for English and Whitworth standard threads.

These Pipe Machines are, without doubt, the best and most convenient machines of their kind made. The dies are quick opening and adjustable. Each set of four pieces cuts two sizes of pipe, which is a great point in favor of the machine when new dies are required.

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FIG. 300.



BUSHING OR
DIE SUPPORTER

No. 11 PIPE MACHINE.

1½ TO 6 INCH QUICK OPENING, ADJUSTABLE DIES.

Weight, about 2400 pounds. Floor space, 3 feet 3 inches x 6 feet.

Speed of countershaft, 200 revolutions.

Diameter of pulleys, one tight and two loose, 14 inches for 4 inch belt.

Cone has 3 steps for 3½ inch belt.

Price No. 11 Pipe Machine, including right hand dies, 1½ to 6 inches, and countershaft, - - - - - \$550.00

" Extra dies, 5 sets pipe dies, right or left, at \$4.50 per set, - - - - - 22.50

One set cuts these two sizes:	One set cuts these two sizes:	One set cuts these two sizes:	One set cuts these two sizes:
1½ and 2.	2½ and 3.	3½ and 4.	4½ and 5.
			6.

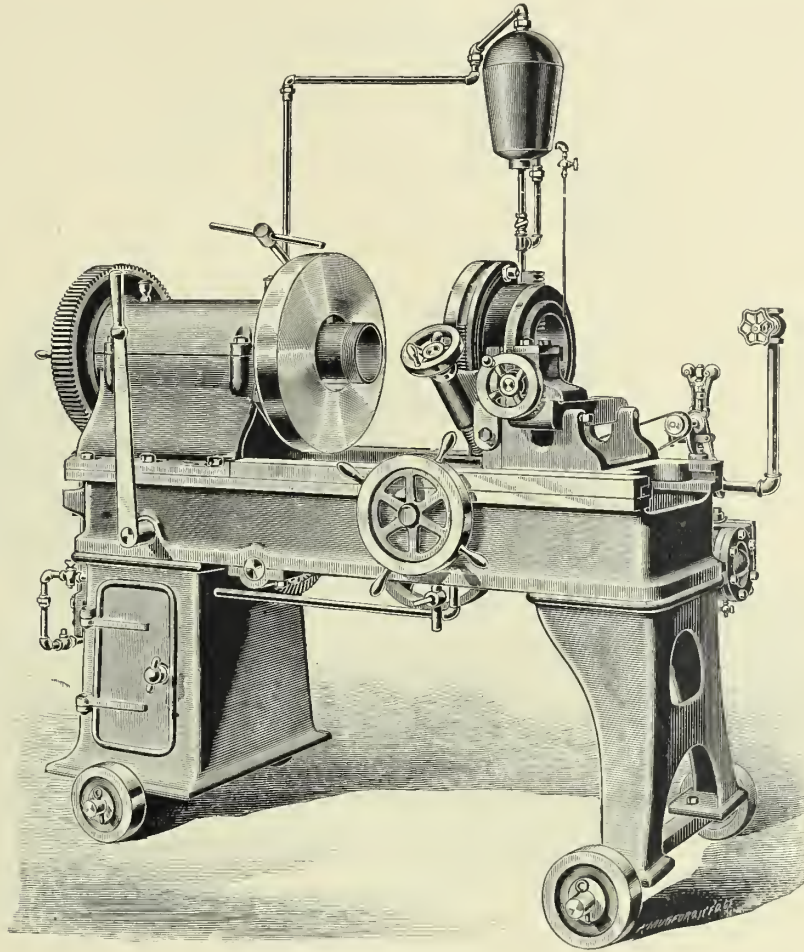
Can furnish extra dies for casing and line pipe. Also for English and Whitworth standard threads.

These Pipe Machines are, without doubt, the best and most convenient machines of their kind made. The dies are quick opening and adjustable. Each set of four pieces, up to five inches, cuts two sizes of pipe, which is a great point in favor of the Machine when new dies are required.

When threading 4 inch and smaller always insert bushing or die supporter into die head to stiffen the dies. This machine has six changes of speed, without removing or replacing gears.

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FIG. 301.



PIPE MACHINE, No. 12.

1½ TO 6 IN. QUICK OPENING, ADJUSTABLE DIES. LUBRICATE DIES WITH LARD OIL.

THIS machine can be easily transported from building to building for the purpose of cutting and threading pipe. This is not only a great convenience, but often times on a single large contract the saving is sufficiently great to pay the first cost of the machine.

With the vertical lever directly above the door, the speed can be changed instantly while running, or the machine be stopped entirely. For threading it is necessary to run at a slower speed than for cutting off pipe.

Use great care when putting the dies into die head to have die number correspond with slot number.

We can furnish extra dies for casing and line pipe. Also for English and Whitworth standard threads.

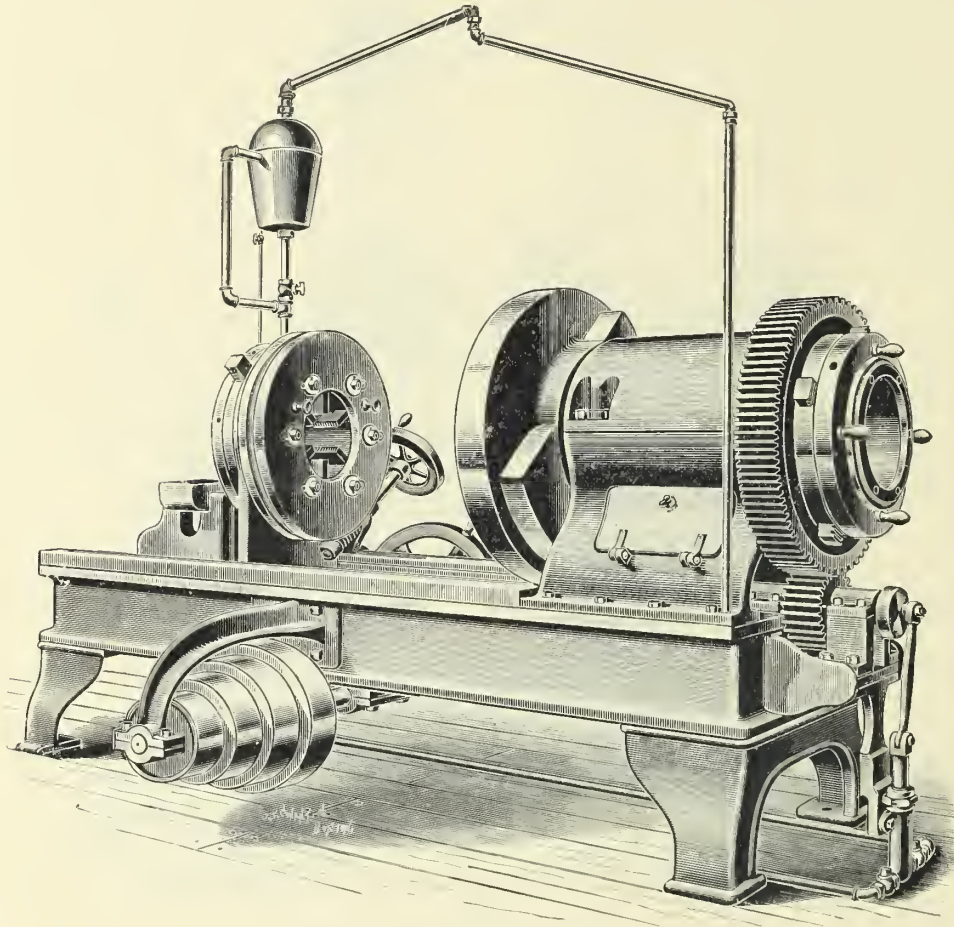
These Pipe Machines are, without doubt, the best and most convenient machines of their kind made. The dies are quick opening and adjustable. Each set of four pieces up to five inches cuts two sizes of pipe, which is a great point in favor of the machine when new dies are required.

After pipe is threaded there is no backing off the dies as in the ordinary manner. All that is necessary is simply to open the dies and run die head back. If pipe is to be cut off the dies will expand far enough to admit of pipe passing through them to the cutting-off knife. When dies require sharpening they can be quickly removed and ground on an ordinary grindstone. The die head is also provided with an adjustable stop pin which is very convenient when a large number of threads of the same size are to be cut. Ordinarily every time a thread is cut the dies must be carefully reset. With this adjustable stop the dies are first set to the size to be threaded, then the adjustable stop moved and secured, which will only allow the cam to move to the point required to thread the proper size without the necessity of carefully resetting for every thread that is to be cut. The pump insures a steady supply of oil to lubricate dies and knife.

There are no loose bushings on the machine which, when required, cannot be found. Our machine has on back end of spindle an adjustable self-centering chuck to center the pipe. Also the same on die head to steady the pipe when being cut with cutting-off knife. The gripping chuck is self-centering too and very powerful. Weight, about 2400 pounds. Floor space, 3 feet 3 inches x 6 feet.

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FIG. 302.



No. 13 PIPE MACHINE.

BACK VIEW.

2½ TO 8 INCHES QUICK OPENING, ADJUSTABLE DIES.

Speed of countershaft, 200 revolutions.

Diameter of pulleys, one tight and two loose, 18 inches for 4 inch belt.

Cone has 4 steps for 4 inch belt.

When threading 6 inch and smaller always insert the bushing or die supporter into the die head to stiffen the dies. This machine has eight changes of speed without removing or replacing gears.

Price No. 13 Pipe Machine, including right hand dies, 2½ to 8 inches, and countershaft,	-	-	-	-	\$900.00
“ Cutting-off Knife	-	-	-	-	1.00
“ Extra dies, six sets of pipe dies, right or left, at \$7.00 per set,	-	-	-	-	42.00

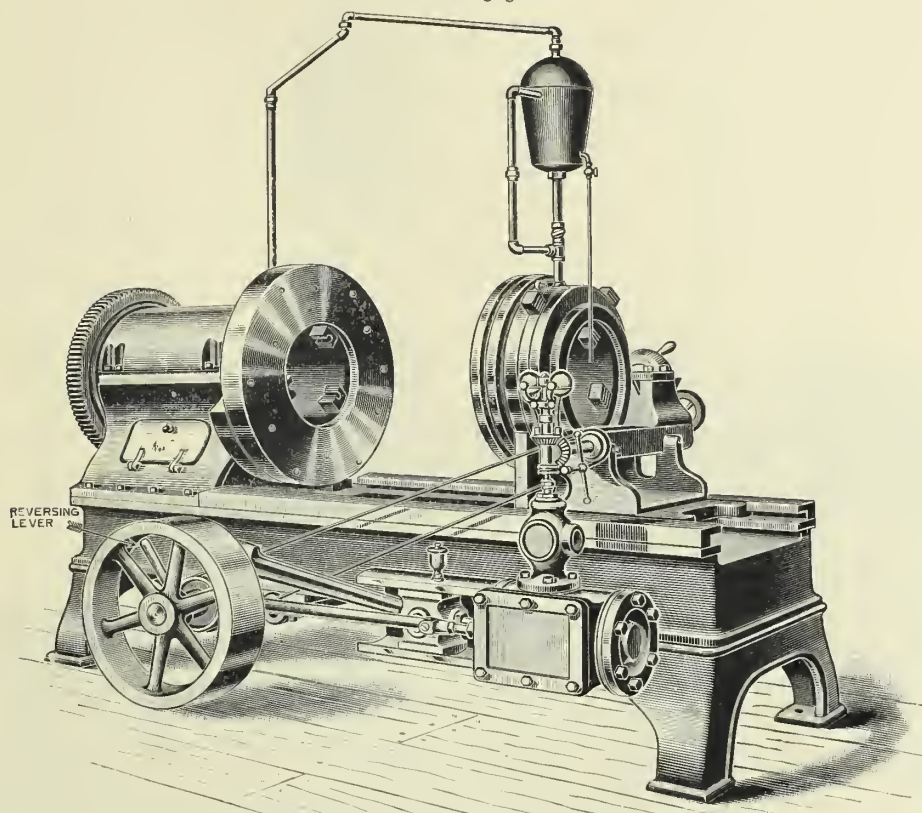
One set cuts these two sizes :
2½ and 3.

One set cuts these two sizes :
3½ and 4.

One set cuts these two sizes :
4½ and 5.

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FIG. 303.



No. 16 PIPE MACHINE.

2½ TO 10 INCHES QUICK OPENING ADJUSTABLE DIES. LUBRICATE DIES WITH LARD OIL.

Weight, about 7000 pounds.

Floor space, 3 feet 8 inches x 8 feet 3 inches.

In order to reverse engine for cutting left hand threads, loosen set screw in eccentric cam. Move cam by aid of reversing lever in opposite direction to which engine is to run.

Dimensions of cylinder, 6 x 8 inches. Governor pulley provided with steps for changing speed of engine. The fly wheel has a 3½-inch face for belting to a line shaft if desired for operating other machinery. The engine is so arranged that by the movement of a lever it can be disconnected from the pipe machine part.

When threading 8-inch and smaller always insert the bushing or die supporter into die head to stiffen the dies.

The gripping jaws in chuck take 4½ to 10 inches, while those shown on the floor take 2½ to 8 inches. For gripping smaller than 4½ inches it is necessary to remove chuck cover and change the jaws, which can be easily and quickly done.

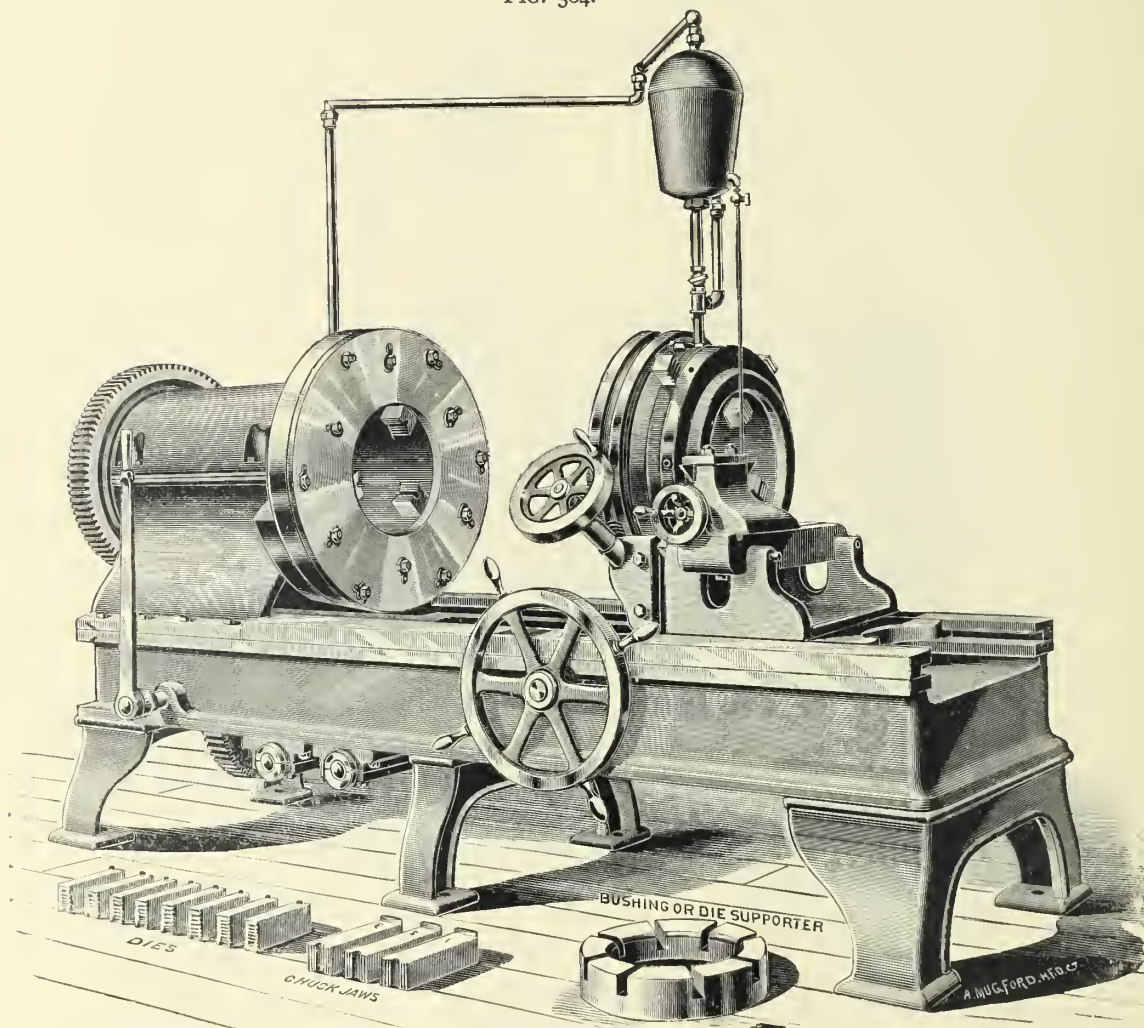
Price, No. 16 pipe machine, including right-hand dies, 2½ to 10,	-	-	-	-	-	-	-	-	-	\$1,325.00
" Cutting-off knife,	-	-	-	-	-	-	-	-	-	1.00
" Extra dies, 8 sets of pipe dies, right or left, at \$8.00 per set,	-	-	-	-	-	-	-	-	-	64.00
One set cuts these two sizes :	2½ and 3.		One set cuts these two sizes :	3½ and 4.		One set cuts these two sizes :	4½ and 5.			

Can furnish extra dies for casing and line pipe. Also for English and Whitworth standard threads.

These pipe machines are without doubt the best and most convenient machines of their kind made. The dies are quick opening and adjustable. Each set of six pieces up to five inches cuts two sizes of pipe, which is a great point in favor of the machine when new dies are required.

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FIG. 304.



No. 19 PIPE MACHINE.

7 TO 16 INCHES QUICK OPENING, ADJUSTABLE DIES.

Speed of countershaft, 200 revolutions.

Diameter of pulleys, one tight and two loose, 20 inches for 5 inch belt.

Cone has 4 steps for 5 inch belt.

With the vertical lever the speed can be changed instantly while running, or the machine can be stopped entirely.

For threading it is necessary to run at a slower speed than for cutting off pipe.

When threading 12 inches and smaller always insert the bushing or die supporter into the die head to stiffen the dies.

This machine has eight changes of speed without removing or replacing gears.

Price No. 19 Pipe Machine, including right hand dies, 7 to 16 inches, and countershaft, - - - - - \$2,000 00

" Cutting-off knife, - - - - - 1 50

" Extra dies, 7 sets of pipe dies, right or left, at \$16.00 per set, - - - - - 112 00

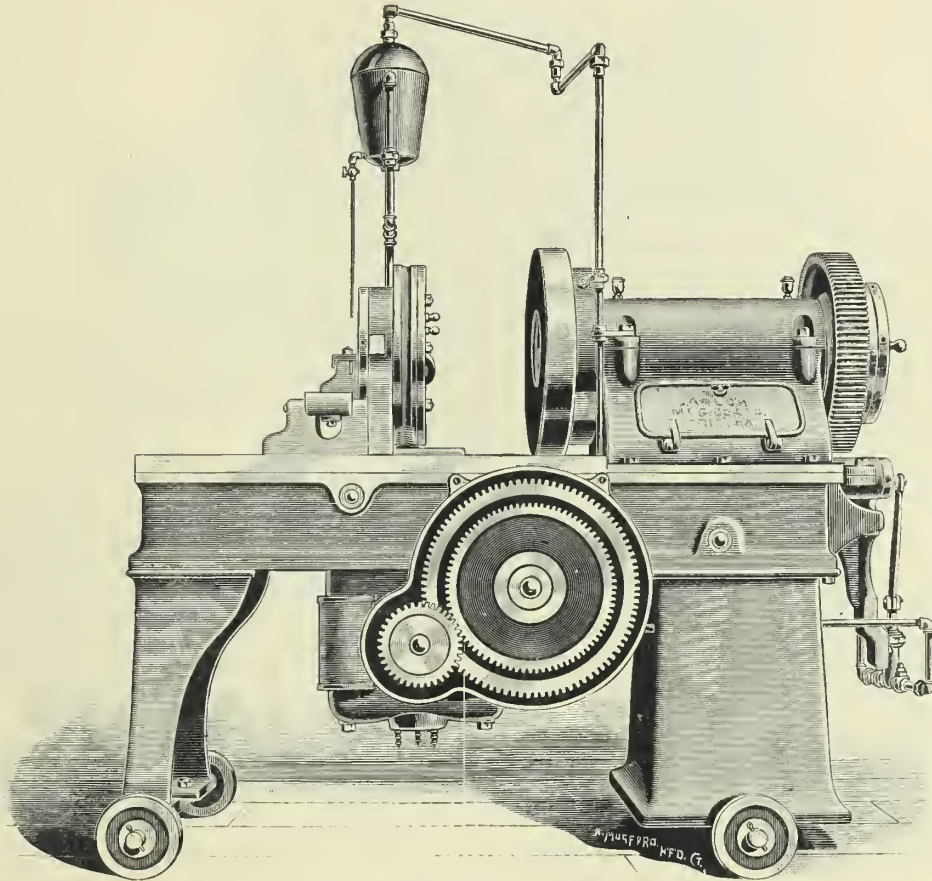
Can furnish dies for threading casing and line pipe. Also for English and Whitworth standard threads.

These Pipe Machines are, without doubt, the best and most convenient machines of their kind made. The dies are quick opening and adjustable.

There are no loose bushings on the machine which, when required, cannot be found. Our machine has on back end of spindle an adjustable self-centering chuck to center the pipe. Also the same on die head to steady the pipe when being cut with cutting-off knife. The gripping chuck is self-centering too, and very powerful.

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FIG. 305.



1 1/2 TO 6 INCH PIPE MACHINE, WITH ELECTRIC MOTOR ATTACHMENT.

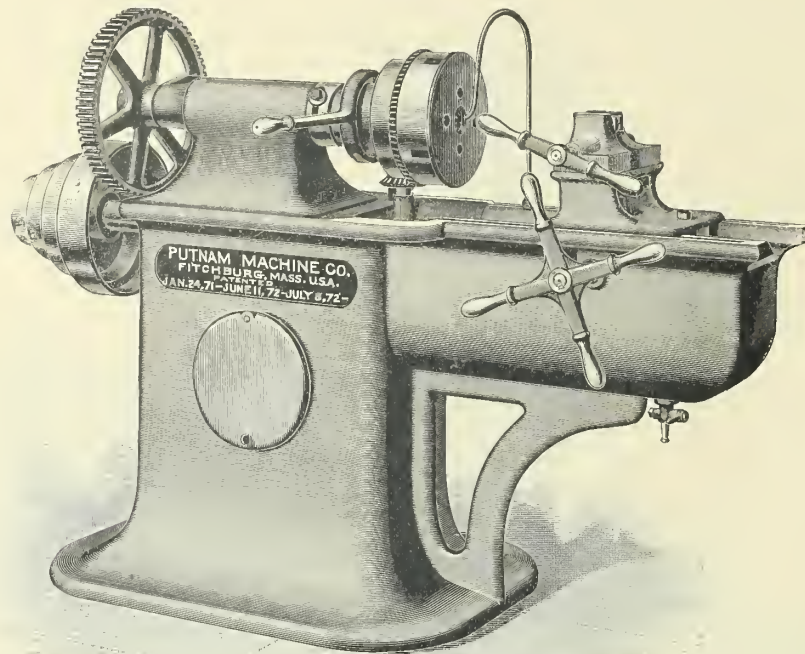
WE can furnish any of our pipe machines with electric motors, so arranged as to have all the changes of speed necessary, reverse motion, etc. Prices on application.

These machines can be easily transported from building to building for the purpose of cutting and threading pipe. This is not only a great convenience, but often times on a single large contract the saving is sufficiently great to pay the first cost of the machine.

In any community where electric power is furnished these machines can be easily operated, as all that is necessary is simply to run an electric wire to and connect it with the motor.

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FIG. 306



LATEST IMPROVED PATENT 4-DIE BOLT AND NUT TAPPING MACHINE, WITH AUTOMATIC OIL PUMP.

HAVE hollow spindles, and will admit bolts of any desired length; are simple in construction, easily operated, and not liable to get out of order; have opening dies which are made to vary in size; the diameter of the threads cut are made larger or smaller by the aid of an adjusting index. The durability, precision and production of these machines are unsurpassed. The dies are quickly and easily changed from one size to another, and when dulled by use can be resharpened (without drawing the temper) by grinding on an ordinary emery-wheel or grindstone. Will cut right or left hand. Left hand dies are extra, and furnished only to order; is not necessary to stop or reverse the machine to cut or change the bolts, which are cut AT ONE OPERATION (or once passing over), with uniform diameter, size and lead.

Extra dies, taps or hobs furnished to order.

No. 1 will cut from $\frac{1}{4}$ to 1 inch diameter, with the following taps and dies: $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$ and 1 inch. Weight, 1000 pounds. Hobs for recutting dies.

Tight and loose pulleys on counter, 18 in. diam., 5 in. face.

Countershaft should make 75 revolutions per minute.

Extra dies per set, \$3. Price of machine with taps and dies, \$350.

Boxing, \$. Price of machine without taps, \$335.

No. 2 will cut from $\frac{3}{8}$ to $1\frac{1}{4}$ inches in diameter, with the following taps and dies: $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$ inches. Weight, 1200 pounds. Hobs for recutting dies, \$ extra.

Tight and loose pulleys on counter, 14 inches diameter, $4\frac{1}{4}$ in. face.

Countershaft should make 100 revolutions per minute.

Extra dies per set, \$4. Price of machine with taps and dies, \$400.

Boxing, \$. Price of machine without taps, \$380.

No. 3 will cut from $\frac{7}{16}$ to $1\frac{1}{2}$ inches diameter, with the following taps and dies: $\frac{7}{16}$, $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$ inches. Weight, 1500 pounds. Hobs for recutting dies, \$ extra.

Tight and loose pulleys on counter, 16 inches diameter, $4\frac{1}{2}$ in. face.

Countershaft should make 70 revolutions per minute.

Extra dies per set, \$5. Price of machine with taps and dies, \$450.

Boxing, \$. Price of machine without taps, \$425.

No. 4 will cut from $\frac{5}{8}$ to 2 inches diameter, with the following taps and dies: $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2 inches. Weight, 2400 pounds. Hobs for recutting dies, \$ extra.

Tight and loose pulleys on counter, 18 inches diameter, 5 in. face.

Countershaft should make 80 revolutions per minute.

Extra dies per set, \$6. Price of machine with taps and dies, \$550.

Boxing, \$. Price of machine without taps, \$500.

No. 5 will cut from $\frac{3}{4}$ to $2\frac{1}{2}$ inches diameter, with the following taps and dies: $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 1 $\frac{1}{2}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$ inches. Weight, 3000 pounds. Hobs for recutting dies, \$ extra.

Tight and loose pulleys on counter, 24 inches diameter, 7 in. face.

Countershaft should make 70 revolutions per minute.

Extra dies per set, \$7. Price of machine with taps and dies, \$750.

Boxing, \$. Price of machine without taps, \$685.

No. 6 will cut from $\frac{7}{8}$ to $3\frac{1}{4}$ inches diameter, with the following taps and dies: $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$ inches. Weight, 6800 pounds. Hobs for recutting dies, \$ extra.

Tight and loose pulleys on counter, 28 inches diameter, 8 in. face.

Countershaft should make 40 revolutions per minute.

Extra dies per set, \$9. Price of machine with taps and dies, \$1,500.

Boxing, \$. Price of machine without taps, \$1,375.

No. 7 will cut from 1 to 4 inches diameter, with the following taps and dies: 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, 4 inches. Weight, 7000 pounds. Hobs for recutting dies, \$ extra.

Tight and loose pulleys on counter, 28 inches diameter, 9 in. face.

Countershaft should make 35 revolutions per minute.

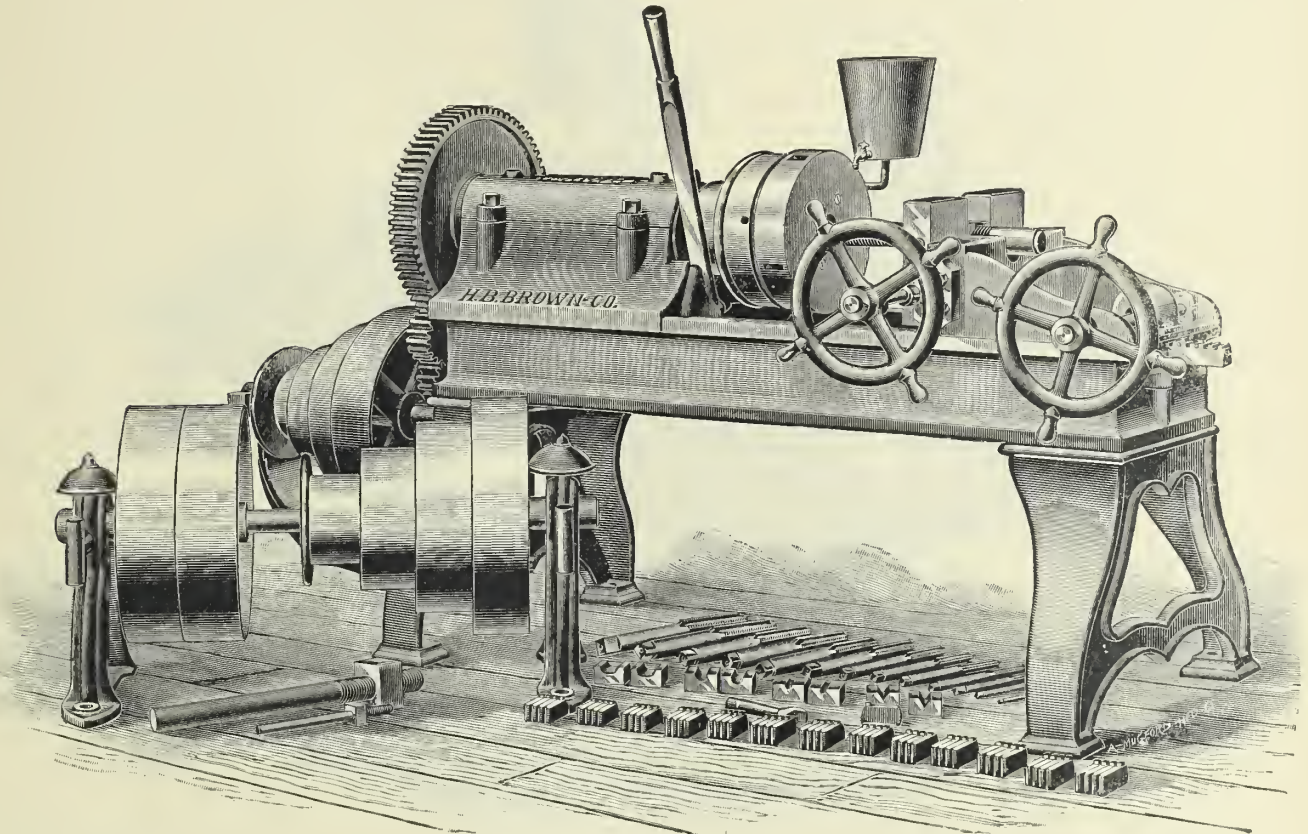
Extra dies per set, \$10. Price of machine with taps and dies, \$1,800.

Boxing, \$. Price of machine without taps, \$1,525.

Each of above machines furnished with countershaft and wrenches, automatic oil pump, with stop-cock and adjustable standard.

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FIG. 307.



MERRIMAN BOLT CUTTERS.

DESIGN SHOWING SIZES NOS. 3, 4, 5 AND 6.

THE above cut shows the No. 3 Machine, and the general design as shown is followed in all the larger sizes, details of the capacity of each being enumerated in the following table. Oil pumps and the automatic opening device can be furnished with any of these sizes at a small additional price.

Size No. 3.	Diameter of bolt,	$\frac{1}{2}$, 13,	$\frac{5}{8}$, 11,	$\frac{3}{4}$, 10,	$\frac{7}{8}$, 9,	1, 8,	$1\frac{1}{8}$, 7,	$1\frac{1}{4}$, 7,	$1\frac{3}{8}$, 6,	$1\frac{1}{2}$, 6,	$1\frac{5}{8}$, 5 $\frac{1}{2}$,	$1\frac{3}{4}$, 5,	$1\frac{7}{8}$, 5,	2, 4 $\frac{1}{2}$.
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Speed of countershaft, 150. Diameter of pulley, 16 inches, $4\frac{1}{2}$ inch face. Weight, about 2200 pounds.

This is a heavy back-geared machine, so arranged as to give eight changes of speed, thus fitting it for a large range of work, from very large down to moderately small, and doing any size with celerity.

Size No. 4.	Diameter of bolt,	$\frac{1}{2}$, 13,	$\frac{5}{8}$, 11,	$\frac{3}{4}$, 10,	$\frac{7}{8}$, 9,	1, 8,	$1\frac{1}{8}$, 7,	$1\frac{1}{4}$, 7,	$1\frac{3}{8}$, 6,	$1\frac{1}{2}$, 5 $\frac{1}{2}$,	$1\frac{3}{4}$, 5,	$1\frac{7}{8}$, 5,	2, 4 $\frac{1}{2}$,	$2\frac{1}{4}$, 4 $\frac{1}{2}$,	$2\frac{1}{2}$, 4.
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Speed of countershaft, 150. Diameter of pulley, 16 inches by $4\frac{1}{2}$ face. Weight, about 2600 pounds.

This, like the No. 3, is a heavy, back-geared machine, intended for bridge and other bolt work.

Size No. 5.	Diameter of bolt,	1, 8,	$1\frac{1}{8}$, 7,	$1\frac{1}{4}$, 7,	$1\frac{3}{8}$, 6,	$1\frac{1}{2}$, 6,	$1\frac{5}{8}$, 5 $\frac{1}{2}$,	$1\frac{3}{4}$, 5,	$1\frac{7}{8}$, 5,	2, 4 $\frac{1}{2}$,	$2\frac{1}{8}$, 4 $\frac{1}{2}$,	$2\frac{1}{2}$, 4,	$2\frac{3}{4}$, 4,	3, 3 $\frac{1}{2}$.
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Speed of countershaft, 100. Diameter of pulley, 18 inches by $4\frac{1}{2}$ face. Weight, about 3200 pounds.

This machine is back-geared like a lathe, has eight speeds, and the holding vise has two screws geared together, so that it is capable of holding securely the heaviest work, or of tapping the heaviest nuts. It is intended for doing a very large range of work, from small to very heavy bolts.

Size. No 6.	Diameter of bolt,	1, 8,	$1\frac{1}{8}$, 7,	$1\frac{1}{4}$, 7,	$1\frac{3}{8}$, 6,	$1\frac{1}{2}$, 6,	$1\frac{5}{8}$, 5 $\frac{1}{2}$,	$1\frac{3}{4}$, 5,	$1\frac{7}{8}$, 5,	2, 4 $\frac{1}{2}$,	$2\frac{1}{4}$, 4 $\frac{1}{2}$,	$2\frac{1}{2}$, 4,	$2\frac{3}{4}$, 4,	3, 3 $\frac{1}{2}$,	$3\frac{1}{4}$, 3 $\frac{1}{2}$,	$3\frac{1}{2}$, 3 $\frac{1}{4}$,	4, 3,
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This machine can be fitted to cut to $4\frac{1}{2}$ inches, if desired. It is a very strongly-geared tool, capable of doing its heaviest work with facility.

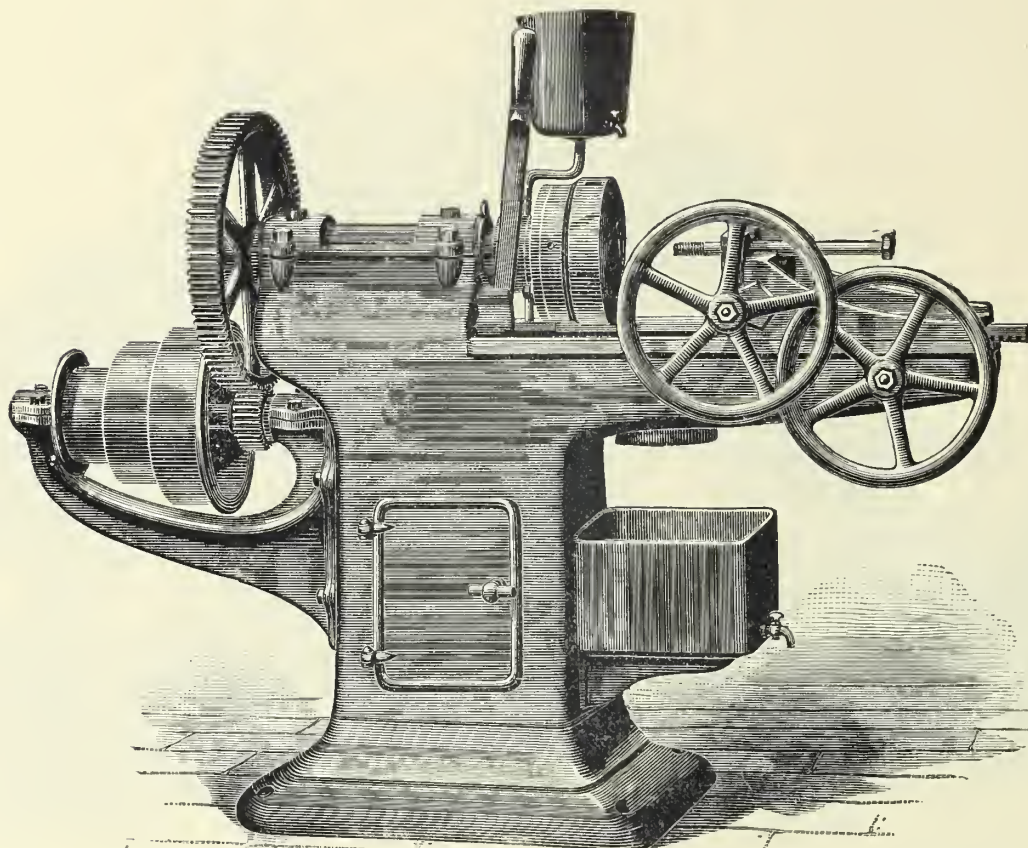
With all machines are furnished dies and taps ready for use, oiling apparatus tap holders for holding the taps when tapping nuts, dies for holding bolts and nuts, also countershafts, pulleys, hangers and wrenches.

Hobs for recutting dies will be sent only on special order. Cuts or photographs and prices of any size furnished on demand.

The United States standard of threads, adopted and recommended by the Franklin Institute of Pennsylvania, and now in general use, is the standard which we follow. The top and bottom are flat one-eighth of the pitch. Unless otherwise ordered, we shall furnish taps of U. S. Standard form, but made 1-32 inch over size for rough iron work. Other styles, as the Whitworth (English) and the old-fashioned sharp V thread, will be made to order.

PRENTISS TOOL & SUPPLY CO.

FIG. 308.



MERRIMAN BOLT CUTTER, SIZE No. 2, OR 1 1/2 INCH MACHINE.

THIS is a very popular and satisfactory machine, meeting every reasonable demand for railroad and general machine shops bolt work, or general jobbing. The dies can be changed instantly from one sized bolt to another, or from threading bolts to tapping nuts, and without turning a screw or nut. The machine has a gear cut from the solid, 18 inches diameter, driven by a pinion direct from a cone of pulleys having broad belt surfaces, and giving sufficient power on the largest sizes, and sufficient speed on the smaller sizes.

The spindle is hollow, so that a bolt can be threaded to any desirable length.

An automatic attachment for throwing off the dies, when the thread has been cut to any desired point, can be furnished at cost price extra.

Oil Pumps.—We supply every machine with oiling apparatus, but do not furnish oil pumps, except on special order, at small cost.

Pipe Work.—Within the capacity of the machine, pipe can be threaded with great facility in these machines and with more rapidity than with a pipe threading machine, as the pipe is immediately released when threaded, without backing the dies from the thread. Pipe-thread dies cost the same per set as bolt-thread dies.

Taps and dies usually furnished with the No. 2 machine.

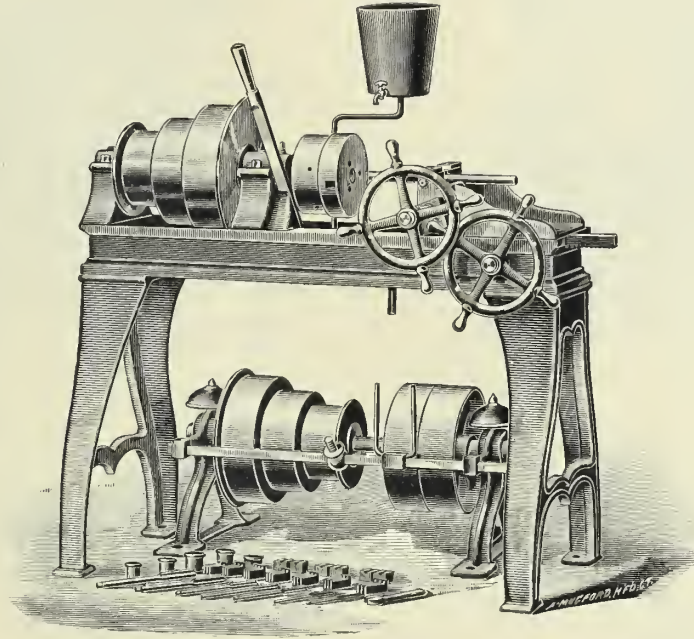
Size No. 2.	{	Diameter of bolt.....	3/8,	1/2,	5/8,	3/4,	7/8,	1,	1 1/8,	1 1/4,	1 3/8,	1 1/2.
		Threads per inch..	16,	13,	11,	10,	9,	8,	7,	7,	6,	6.

Speed of countershaft, 150; diameter of pulley, 12 inches, 3 inch face; weight, complete, 1000 pounds.

Further particulars and price upon application.

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FIG. 309.



MERRIMAN BOLT CUTTER, SIZE No. 1, OR 3-4 INCH MACHINE.

THIS machine is intended for rapid work on small sizes of iron, from and including $\frac{1}{4}$ inch up to $\frac{3}{4}$ inch. Is constructed without gearing, but it has a cone of pulleys with broad belt service, intended to give sufficient power for any work within the range stated. It is made with automatic-opening dies, at a small extra cost, if so desired. The spindle is hollow, so that bolts can be threaded to any desirable length. Taps and dies usually furnished with this machine, according to the following schedule of sizes and pitch of threads:

Size No. 1.	{	Diameter of bolt . . .	$\frac{1}{4}$,	$\frac{5}{16}$,	$\frac{3}{8}$,	$\frac{7}{16}$,	$\frac{1}{2}$,	$\frac{5}{8}$,	$\frac{3}{4}$.
		Threads per inch . . .	20,	18,	16,	14,	13,	11,	10.

Speed of countershaft, 125 revolutions; diameter of pulley, 12 inches, 3 inch face; weight, complete, 600 pounds.

They will cut the usual V, square, or ratchet threads, with equal facility, and at one cut.

They are provided with an "index," by the use of which the machine can be instantly adjusted to cut the required size so that the bolts can be made to fit the nuts.

They are provided with means for tapping nuts when needed, and the change from cutting bolts to tapping nuts can be made in a minute, or vice versa.

In the perfection of the thread produced they are surpassed by no other machine.

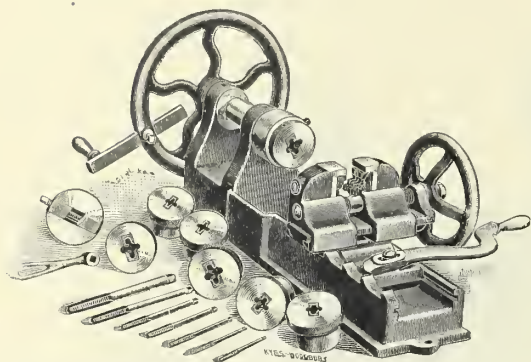
In rapidity they surpass all ordinary machines, their capacity being several times as great as that of the ordinary kind.

They are so simple in construction that they are not liable to get out of order.

Complete detail and prices furnished upon application.

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FIG. 310.



HAND BOLT CUTTER AND NUT TAPPER.

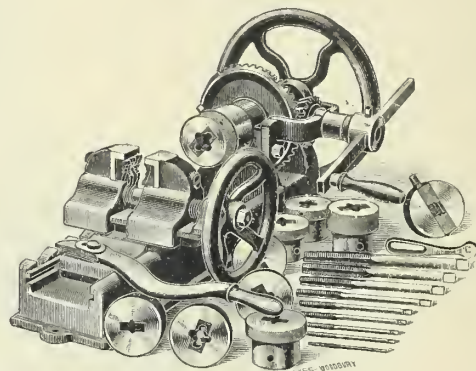
No. 6.

Above machine complete, with tap chuck, taps, dies and collets.

Cutting, $\frac{1}{4}^{20}$, 5-16¹⁸, $\frac{3}{8}^{16}$, 7-16¹⁴, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$.
Price, \$50.00.

Weight complete, 150 pounds.

FIG. 311.



HAND BOLT CUTTER AND NUT TAPPER.

No. 7.

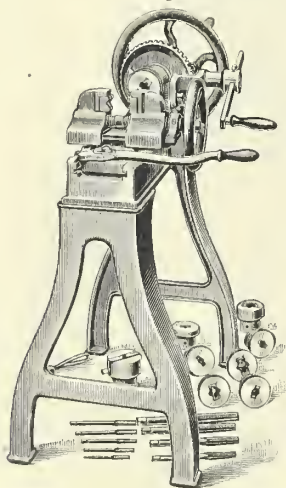
Above machine complete, with tap chuck, taps, dies and collets.

Cutting, $\frac{1}{4}^{20}$, 5-16¹⁸, $\frac{3}{8}^{16}$, 7-16¹⁴, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1".
Price, \$70.00.

Weight complete, 200 pounds.

Has improved clutch on spindle for running die off after thread is cut, making quick return.

FIG. 312.



Nos. 6 and 7, Mounted on Legs.

ASSORTMENT No 6.

With tap chuck, taps, dies and collets.

Cutting, $\frac{1}{4}^{20}$, 5-16¹⁸, $\frac{3}{8}^{16}$, 7-16¹⁴, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$.
Price, \$57.00.

Weight of above machine, 185 pounds.

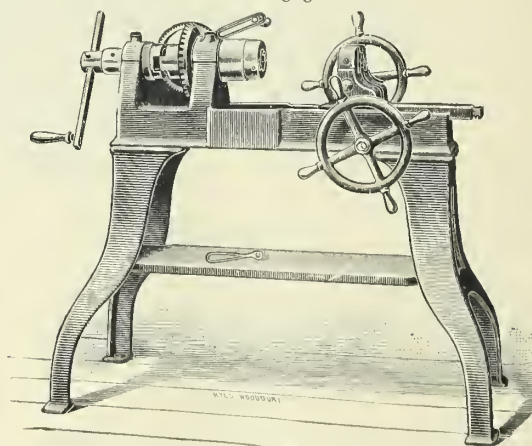
ASSORTMENT No. 7.

With tap chuck, taps, dies and collets.

Cutting, $\frac{1}{4}^{20}$, 5-16¹⁸, $\frac{3}{8}^{16}$, 7-16¹⁴, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1".
Price, \$77.00.

Weight of above machine, 235 pounds.

FIG. 313.



HAND BOLT CUTTER AND NUT TAPPER.

Nos. 8 and 8½.

This machine has three changes of speed, multiplying the power two and seven times, and equalizing it once.

ASSORTMENT No. 8.

Cutting, $\frac{1}{4}^{20}$, 5-16¹⁸, $\frac{3}{8}^{16}$, 7-16¹⁴, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1".
Price, \$90.00.

ASSORTMENT No. 8½.

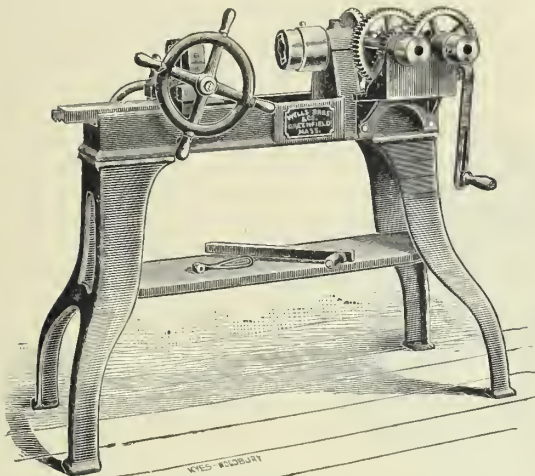
Cutting, $\frac{1}{4}^{20}$, 5-16¹⁸, $\frac{3}{8}^{16}$, 7-16¹⁴, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1",
 $1\frac{1}{8}^7$, $1\frac{1}{4}^7$.
Price, \$108.00.

Weight of machine, 350 pounds.

This machine has our improved tail block jaws, for hold iron; also clutch on spindle, for throwing out gear.

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FIG. 314.



HAND BOLT CUTTER AND NUT TAPPER.
No. 9.

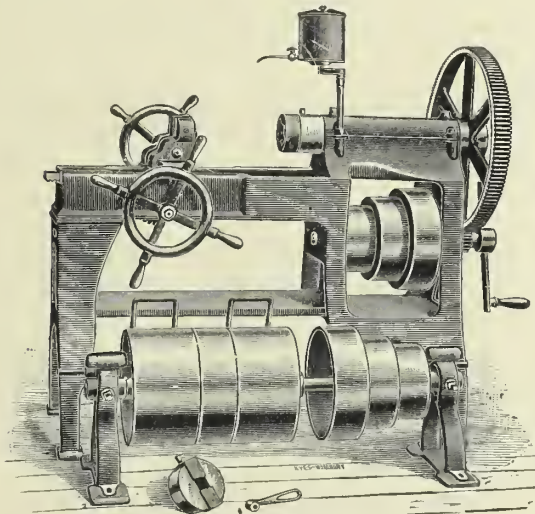
This machine has four changes of speed, multiplying the power 14, 7 and 2 times, and equalizes it once.
This machine has clutch on spindle for throwing out gear, also our improved jaws for holding iron in the tail block. Has hollow spindle.

ASSORTMENT No. 9.

With tap chuck, taps, dies and collets.
Cutting, $\frac{3}{8}$ ¹⁶, $\frac{7}{16}$ ¹⁴, $\frac{1}{2}$ ¹², $\frac{5}{8}$ ¹¹, $\frac{3}{4}$ ¹⁰, $\frac{7}{8}$ ⁹, 1⁸, 1 $\frac{1}{8}$ ⁷, 1 $\frac{1}{4}$ ⁷, 1 $\frac{3}{8}$ ⁶, 1 $\frac{1}{2}$ ⁶. Price, \$140.00.

We furnish balance wheel on end of spindle for \$5.00 extra. Weight of machine, 400 pounds.

FIG. 316.

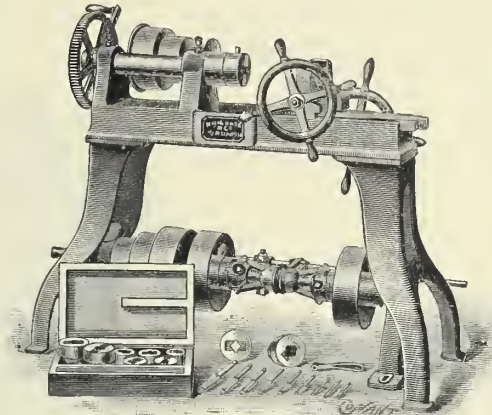


BOLT CUTTER AND NUT TAPPER.
No. 12.

Complete, with plain countershaft, tap chuck, taps, dies and collets.
Cutting, $\frac{3}{8}$ ¹⁶, $\frac{7}{16}$ ¹⁴, $\frac{1}{2}$ ¹², $\frac{5}{8}$ ¹¹, $\frac{3}{4}$ ¹⁰, $\frac{7}{8}$ ⁹, 1⁸, 1 $\frac{1}{8}$ ⁷, 1 $\frac{1}{4}$ ⁷, 1 $\frac{3}{8}$ ⁶, 1 $\frac{1}{2}$ ⁶. Price, \$165.00.

If with friction clutch, \$10.00 extra. Weight of machine complete, 850 pounds. Speed of countershaft, 200 revolutions per minute. Size of driving pulleys on countershaft, $3\frac{1}{2}$ x 12.

FIG. 315.



POWER BOLT CUTTERS AND NUT TAPPERS.
Nos. 10 and 10 $\frac{1}{2}$.

Complete, with plain countershaft, tap chuck, taps, adjustable dies and collets.

ASSORTMENT No. 10.

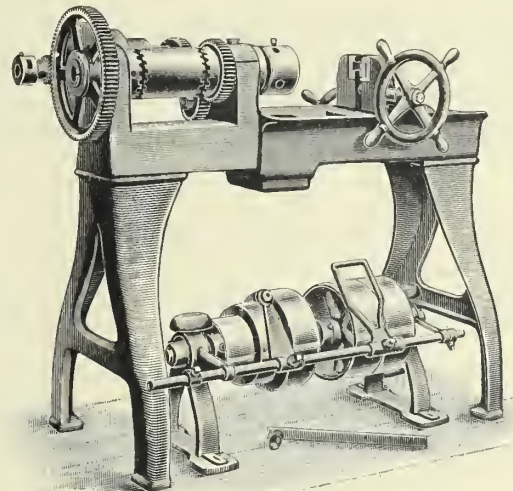
Cutting, $\frac{1}{4}$ ²⁰, $\frac{5}{16}$ ¹⁸, $\frac{3}{8}$ ¹⁶, $\frac{7}{16}$ ¹⁴, $\frac{1}{2}$ ¹², $\frac{5}{8}$ ¹¹, $\frac{3}{4}$ ¹⁰, $\frac{7}{8}$ ⁹, 1⁸.
Price, \$115.00. If with friction clutch, \$10.00 extra.

ASSORTMENT No. 10 $\frac{1}{2}$.

Cutting, $\frac{1}{4}$ ²⁰, $\frac{5}{16}$ ¹⁸, $\frac{3}{8}$ ¹⁶, $\frac{7}{16}$ ¹⁴, $\frac{1}{2}$ ¹², $\frac{5}{8}$ ¹¹, $\frac{3}{4}$ ¹⁰, $\frac{7}{8}$ ⁹, 1⁸, 1 $\frac{1}{8}$ ⁷, 1 $\frac{1}{4}$ ⁷. Price, \$133.90.

If with friction clutch, \$10.00 extra.
Weight of machine, 600 pounds. Speed of countershaft, 250 revolutions per minute. Size of driving pulleys on countershaft, $3\frac{1}{2}$ x 10 inches.

FIG. 317.



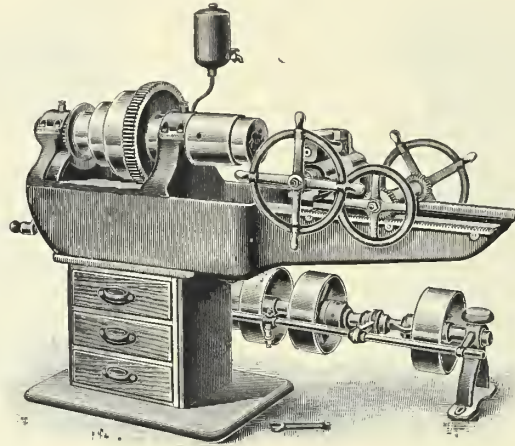
POWER BOLT AND NUT TAPPER.
No. 14.

Machine No. 14, with countershaft, tap chuck, taps, dies and collets.
Cutting, $\frac{1}{4}$ ¹⁶, $\frac{5}{16}$ ¹⁴, $\frac{3}{8}$ ¹², $\frac{7}{16}$ ¹⁰, $\frac{1}{2}$ ⁸, $\frac{5}{8}$ ⁶, $\frac{3}{4}$ ⁴, $\frac{7}{8}$ ³, 1 inch. Price, \$155.00.
When countershaft is not wanted deduct \$15.00.

The machine is arranged with automatic quick return. By pushing up on tail block dies are run on to the bolt. By pushing back on tail block dies are run off automatically at an increased speed. This in many kinds of work makes this machine a rival of an open die machine. But one belt is needed on countershaft.
Speed of countershaft, 250 revolutions per minute.

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FIG. 318.



NO. 20. BACK-GEARED MACHINE.
BOLT CUTTER AND NUT TAPPER.

Price List and Assortments.

ASSORTMENT NO. A 20.

Machine No. 20, with friction clutch countershaft, tap chuck, taps, dies and collets, cutting $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$ inches, - - - - - \$290.00

ASSORTMENT NO. B 20.

Machine No. 20, with friction clutch countershaft, tap chuck, taps, dies and collets, cutting $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2 inches, - - - - - 328.20

If plain countershaft is wanted deduct \$10.00 from above prices.

Speed of countershaft, 200 revolutions per minute, which gives a range from 10 to 400 revolutions of spindle per minute. Machine has six speeds.

Sizes of Bolt Cutter Heads.

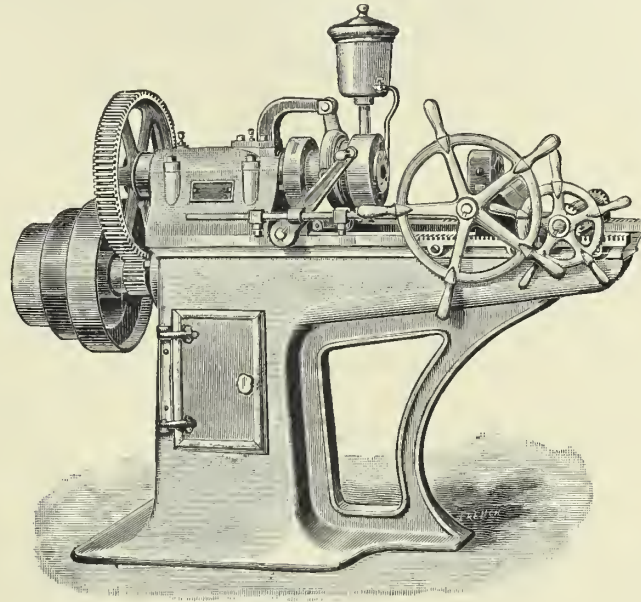
Prices of Dies.

No.	Diameter of Flange.	Entire Length.	Size of Hole.	Capacity Up to	Price Without Dies	Bolt Cutter.	Plain Dies.	Hat Dies.	Case Dies.	Flush Case.	Chasers or Cutters for Case Dies.	Cases.	Hats.	Hat Cutters.	Re-Cutting Dies.
1	6½ inch.	8⅛ inch.	1¾ inch.	1¼ inch.		No. 1	\$2.50	\$3.00	\$4.00	\$4.50	\$1.50	\$2.50	\$.50	\$2.50	\$1.00
2	7¾ inch.	9 inch.	2 inch.	1½ inch.		2	2.50	3.00	4.00	4.50	1.50	2.50	.50	2.50	1.00
3	7¾ inch.	9¼ inch.	2⅝ inch.	2 inch.		3	2.50	3.00	4.50	5.00	1.50	3.00	.50	2.50	1.00
4	10¼ inch.	11½ inch.	3¼ inch.	2½ inch.		3½	3.00	3.50	5.00	6.00	2.00	3.50	1.00	3.00	1.50
5	10¼ inch.	12 inch.	4 inch.	3 inch.		4	3.50	4.00	6.00	6.50	2.00	4.00	1.00	3.00	1.50
6	14 inch.	14 inch.	4¾ inch.	4 inch.		5	3.50	4.00	6.00	6.50	2.00	4.00	1.00	3.00	1.50
7	14¾ inch.	14¾ inch.	7⅝ inch.	6 inch.		6	3.50	4.00	6.00	6.50	2.00	4.00	1.00	3.00	1.50
8	18 inch.	18 inch.	10 inch.	8 inch.		7	5.00	6.00	7.00	7.50	3.00	4.00	2.00	4.00	2.00
						8	5.00	6.00	7.00	7.50	3.00	4.00	2.00	4.00	2.00

Steel heads 2 inches to 3 inches shorter can also be furnished.

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FIG. 319.



(PAT. OCT. 1874, 1879, 1886.)

NO. 2 OR 1 1/4 INCH BOLT CUTTER.

BOLT CUTTERS OF THE ABOVE DESIGN ARE MADE IN ALL SIZES FULLY DESCRIBED ON PAGE 312.

The simplest, strongest, most durable and easiest operated head in the market.

Best mechanical motions of any in the world.

Most simple and positive lock when closed.

Has no toggle lock with five points for lost motion.

Has no toggle lock requiring to pass center to lock at all.

No place for lost motion, when dies are placed in the head and size wanted, is obtained by adjustment; there cannot be a particle of lost motion, the size is fixed absolutely. This differs from the toggle motion.

Head easily kept free from chips and dirt.

Head made to standard jigs and gauges, and all parts are interchangeable.

Advantage of four styles of dies: Plain, hat, case and flush case.

We do not misstate when we say that case and flush case dies can be made double end or reversible.

Plain and hat dies cut in one head fit any other. Case and flush case dies we advise to be cut in their cases. The cases, however, fit any other case or flush case die head.

Flush case die cuts close to the shoulder, the only adjustable opening die that will do this.

Heads are attached to hollow spindle on machine, allowing any length of thread to be cut.

Head is much shorter, more compact, and does not overhang spindle, as some others do.

312



No. 4, OR HEAVY 2 INCH BOLT CUTTER.

Threads and taps $\frac{1}{2}$ to 2 inch, right or left hand. Speed of countershaft, with 18 x 4 inch pulleys, 250 revolutions per minute. Floor space, 7 feet 8 inches by 2 feet 10 inches.

Geared 6 to 1. Weight, 2700 pounds.

Machine, pump, automatic and hand opening and countershaft, - - - - -	\$460.00
Case dies, $\frac{1}{2}$, $\frac{3}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{3}{4}$ and 2 inch, - - - - -	55.00
Nut taps, as per dies, - - - - -	30.00
Adjustable tap chuck and stop die, - - - - -	15.00
Complete, - - - - -	\$560.00

No. 5, OR 2 1-2 INCH BOLT CUTTER.

Threads and taps to $2\frac{1}{2}$ inch, right or left hand. Speed of countershaft, with 18 x 4 inch pulleys, 250 revolutions per minute. Floor space, 7 feet 8 inches by 2 feet 10 inches.

Geared 7 to 1. Weight, 3100 pounds.

Machine, pump, automatic and hand opening and countershaft, - - - - -	\$535.00
Case dies, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$ and $2\frac{1}{2}$ inch, - - - - -	75.00
Nut taps, as per dies, - - - - -	50.00
Adjustable tap chuck and stop die, - - - - -	15.00
Complete, - - - - -	\$675.00

No. 6, OR 3 INCH BOLT CUTTER.

Threads and taps to 3 inch, right or left hand. Speed of countershaft, with 18 x 4 inch pulleys, 250 revolutions per minute. Floor space, 8 feet by 2 feet 10 inches.

Back geared 30 to 1. Weight, 3600 pounds.

Machine, pump, automatic and hand opening and countershaft, - - - - -	\$652.00
Case dies, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$ and 3 inch, - - - - -	78.00
Nut taps, as per dies, - - - - -	75.00
Adjustable tap chuck and stop die, - - - - -	20.00
Complete, - - - - -	\$825.00

No. 7, OR 3 1-2 INCH BOLT CUTTER.

Threads and taps to $3\frac{1}{2}$ inch, right or left hand. Speed of countershaft, with 18 x 4 inch pulleys, 250 revolutions per minute. Floor space, 8 feet 10 inches by three feet.

Back geared 49 to 1. Weight, 4200 pounds.

Machine, pump, automatic and hand opening and countershaft, - - - - -	\$700.00
Case dies, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$ and $3\frac{1}{2}$ inch, - - - - -	90.00
Nut taps, as per dies, - - - - -	115.00
Adjustable tap chuck and stop die, - - - - -	20.00
Complete, - - - - -	\$925.00

No. 8, OR 4 INCH BOLT CUTTER.

Threads and taps to 4 inch, right or left hand. Speed of countershaft, with 18 x 4 inch pulleys, 250 revolutions per minute. Floor space, 8 feet 10 inches by 3 feet.

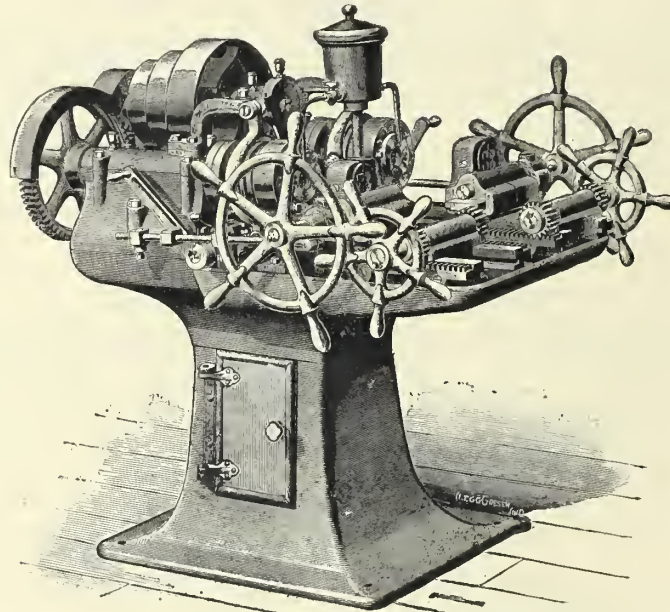
Back geared 49 to 1. Weight, 4400 pounds.

Machine, pump, automatic and hand opening and countershaft, - - - - -	\$795.00
Case dies, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$ and 4 inch, - - - - -	85.00
Nut taps, as per dies, - - - - -	150.00
Adjustable tap chuck and stop die, - - - - -	20.00
Complete, - - - - -	\$1050.00

In ordering always state style of thread required.

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FIG. 320.



1 INCH DOUBLE BOLT CUTTER.

Threads or taps to 1 inch on both heads at one time, right or left hand. Speed of countershaft, with 14 by 4 inch pulleys, 250 revolutions per minute. Floor space, 4 feet by 3 feet 6 inches. Geared, 3 to 1. Weight, 2200 pounds.

Machine, with pump, automatic and hand opening and countershaft,	\$485.00
Case dies, 2 set each, $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$ inch; 1 set each, $\frac{7}{8}$, 1 inch,	45.00
Adjustable tap chuck and stop die,	10.00
Complete,	\$540.00

1 1-2 INCH DOUBLE BOLT CUTTER.

Threads or taps to 1½ inch single head, or on both heads to 1 inch, right or left hand. Speed of countershaft, with 14 by 4 inch pulleys, 250 revolutions per minute. Floor space, 4 feet 9 inches by 4 feet. Geared, 4 to 1. Weight, 2500 pounds.

Machine, with pump, automatic and hand opening, and countershaft,	\$550.00
Case dies, 2 set each, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, 1½, 1¼, 1⅜ and 1½ inch,	60.00
Adjustable tap chuck and stop die,	10.00
Complete,	\$620.00

2 INCH DOUBLE BOLT CUTTER.

Threads or taps to 2 inch on both heads at one time, right or left hand. Speed of countershaft, with 18 by 4½ inch pulleys, 250 revolutions per minute. Floor space, 6 feet 1 inch by 4 feet 5 inch. Single geared, 6¾ to 1. Weight, 4,200 pounds.

Machine, with pump, automatic and hand opening, and countershaft,	\$700.00
Case dies, 2 set each, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, 1½, 1¼, 1⅜, 1½ inch; 1 set each, 1¾, 2 inch,	110.00
Adjustable tap chuck and stop die,	15.00
Complete,	\$825.00

2 1-2 INCH DOUBLE BOLT CUTTER.

Threads or taps to 2½ inch on both heads at one time, right or left hand. Speed of countershaft, with 18 by 4½ inch pulleys, 250 revolutions per minute. Floor space, 6 feet 1 inch by 4 feet 5 inch. Plain geared, 3¼ to 1; back geared, 14½ to 1. Weight, 4500 pounds.

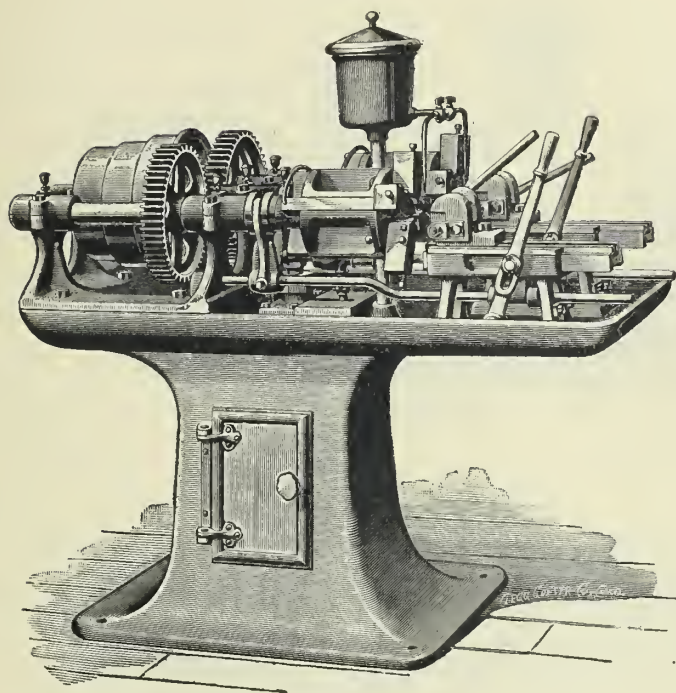
Machine, with pump, automatic and hand opening, and countershaft,	\$850.00
Case dies, 2 set each, $\frac{3}{4}$, $\frac{7}{8}$, 1, 1½, 1¼, 1⅜, 1½, 1¾, 2 inch; 1 set each, 2¼, 2½ inch,	110.00
Adjustable tap chuck and stop die,	15.00
Complete,	\$975.00

In ordering always state style of thread required.

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RAPID TRACK BOLT CUTTER.

FIG. 321.



THE machine is furnished with the "rapid" style of head commonly adopted in bolt works, where continuous threading of bolts for one or two days, without changing dies, is practiced. It is also adapted for cutting lag screws, machine and carriage bolts and general bolt work.

It has three changes of speed, pump and automatic opening, and we furnish any style of vise required.

TWO SPINDLE MACHINE.

Capacity to 1 inch; will thread 5000 track bolts per day; weight, 2000 pounds. Countershaft pulleys, 14 by 4 inch; speed, 250 revolutions per minute.

Price, with countershaft and two sets of dies, \$425.00.

THREE SPINDLE MACHINE.

Capacity to 1 inch; will thread 7000 track bolts per day; weight, 3000 pounds. Countershaft pulleys, 18 by 4½ inch; speed, 250 revolutions per minute.

Price, with countershaft and three sets of dies, \$650.00.

In ordering always state style of thread required.

BOLT CUTTER.

HAND POWER ATTACHMENT.

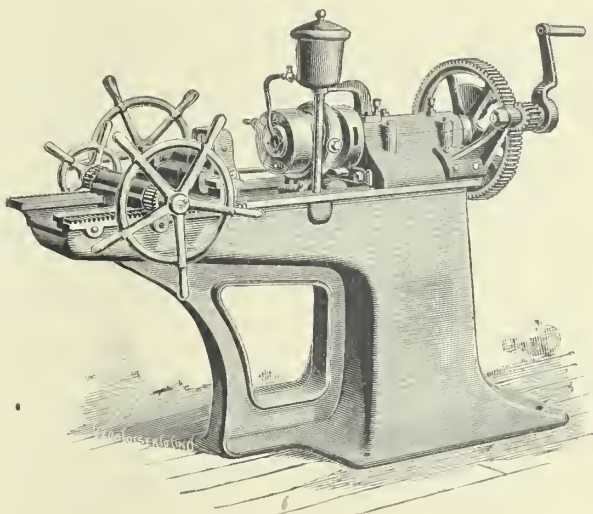
THIS cut illustrates a Bolt Cutter with hand power attachment, which can be applied to the No. 0, No. 1, No. 2 and No. 3 single head machines shown.

This is a very convenient device where power is not attainable, or where only a few bolts are required to be threaded.

We can furnish the machines with both belt and hand attachments if desired.

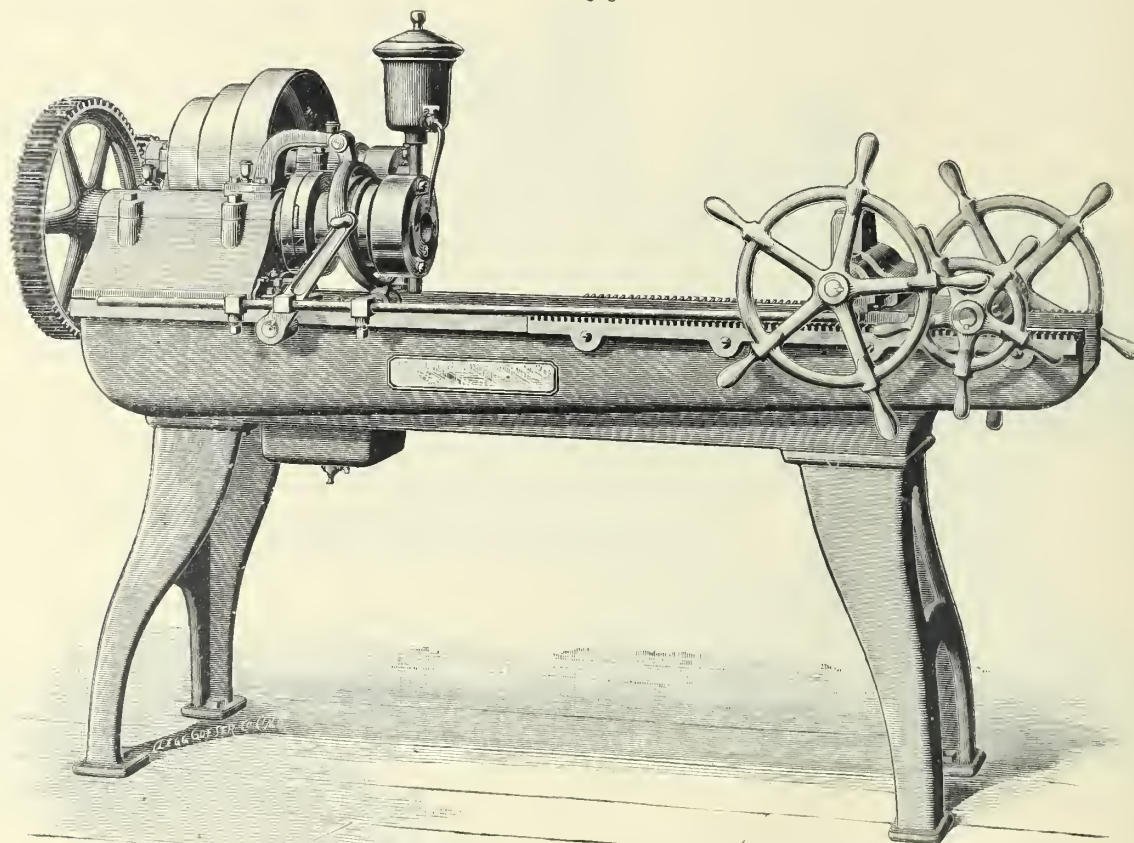
Prices given upon application.

FIG. 322.



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FIG. 323.



(PAT. OCT. 1874, 1879, 1886.)

SINGLE STAY BOLT CUTTER.

THIS machine is designed for boiler and locomotive works, where machine bolts as well as stay bolts are threaded. It will cut right or left hand threads from $\frac{3}{8}$ to $1\frac{1}{2}$ inches in diameter, and from 1 to 36 inches in length, at one vising and by revising bolt thread over 36 inches long can be cut. It is also adapted for tapping of nuts.

This machine is furnished with combined hand and automatic opening, and we can also supply lead screw attachment when desired.

Speed of countershaft, with 14 x 4 inch pulleys, 250 revolutions per minute. Floor space, 6 feet 8 inches by 2 feet.

Geared 5 to 1. Weight, 1900 pounds.

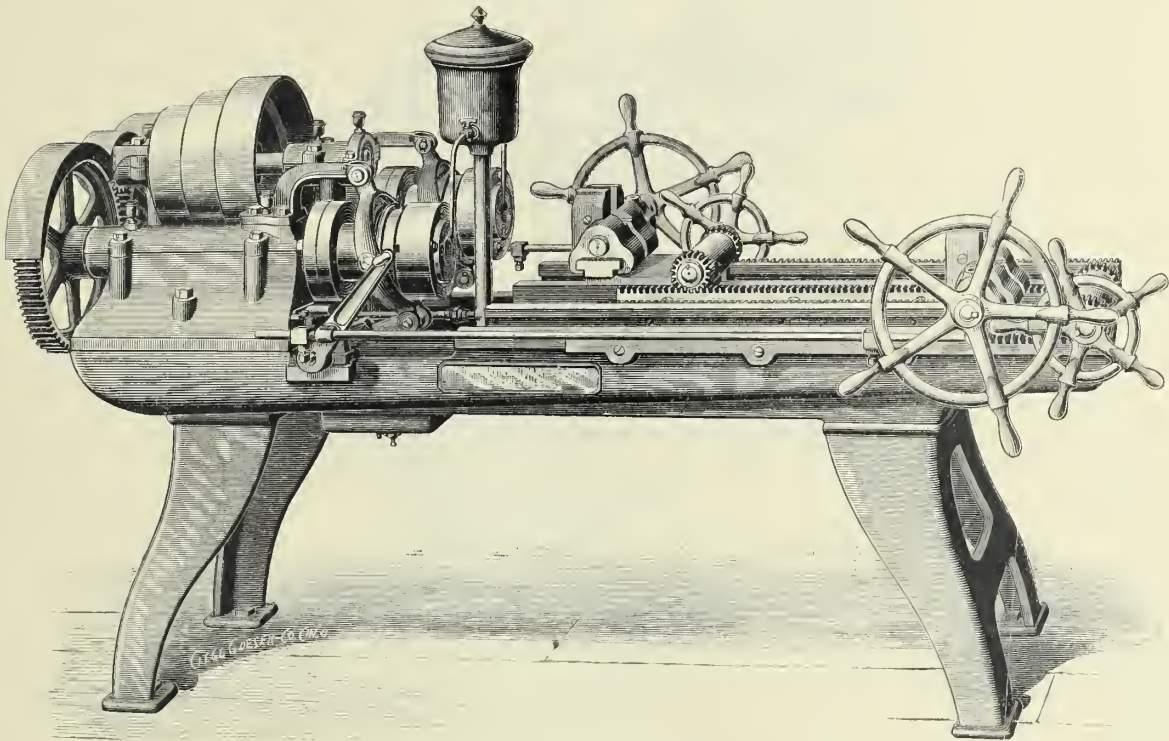
Machine, with pump, automatic and hand opening, countershaft, top chuck and (9) set of case dies,	-	-	\$425.00
Class B, with hat dies,	-	-	385.00
Class C, with plain dies,	-	-	370.00

Plain dies, \$2.50; hat dies, \$3.00; case dies, \$4.50; flush case dies, \$5.00 per set.

In ordering always state style of thread required.

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FIG. 324.



(PAT. OCT. 1874, 1879, 1886.)

DOUBLE STAY BOLT CUTTER.

THIS tool will thread two bolts at the same time, and is designed for large boiler and locomotive works, where quantity as well as quality is essential. It will cut right or left hand threads from $\frac{3}{8}$ to $1\frac{1}{2}$ inches in diameter, and 36 inches of thread without revising. We can also furnish it with lead screw attachment if desired. This machine is also adapted for common bolt threading and tapping of nuts.

Speed of countershaft, with 16 x 4 inch pulleys, 275 revolutions per minute. Floor space, 7 feet $7\frac{1}{2}$ inches by 4 feet. Geared 4 to 1. Weight, 2800 pounds.

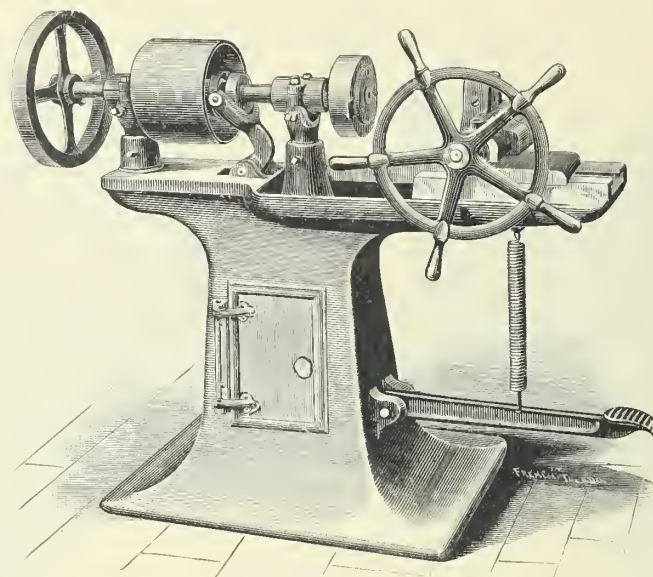
Machine, with pump, automatic and hand opening, and countershaft, tap chuck and (14) set of case dies,	-	\$625.00
Class B, with hat dies,	- - - - -	585.00
Class C, with plain dies,	- - - - -	570.00

Plain dies, \$2.50; hat dies, \$3.00; case dies, \$4.50; flush case dies, \$5.00 per set.

In ordering always state style of thread required.

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FIG. 325.



BOLT POINTER.

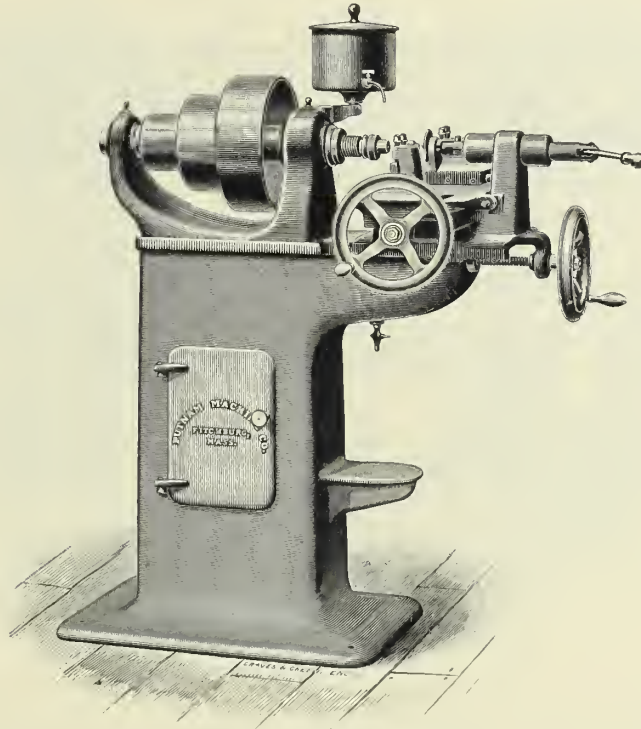
THIS machine is used for forming and finishing the points of all classes of bolts, lag, or coach screws, studs, etc. The pointing tools or knives, consisting of one or more cutters made of flat or square steel, set at a proper angle or angles in a round head, we consider the best method for general pointing. We manufacture a large line of these machines, but only illustrate the one style; as shown. Photographs, etc., of others on application.

Speeds, Capacities and Prices.

No. 1.	Small bench pointer, to $\frac{5}{8}$ inch,	-	-	-	-	-	-	-	-	\$100.00
	Speed, 300 revolutions per minute.									
No. 2.	Small bench pointer, to $\frac{5}{8}$ inch (with steel head),	-	-	-	-	-	-	-	-	115 00
	Speed, 300 revolutions per minute.									
No. 3.	Large bench pointer, to 1 inch (with steel head),	-	-	-	-	-	-	-	-	125.00
	Speed, 200 revolutions per minute.									
No. 4.	Small pedestal pointer, to $\frac{3}{4}$ inch (on frame like cut),	-	-	-	-	-	-	-	-	135.00
	Speed, 250 revolutions per minute.									
No. 5.	Large pedestal pointer, to 1 inch (on frame like cut),	-	-	-	-	-	-	-	-	150.00
	Speed, 200 revolutions per minute.									
No. 6.	Large pointer, to $1\frac{1}{4}$ or $1\frac{1}{2}$ inch (on frame same as No. 2 bolt cutter),	-	-	-	-	-	-	-	-	175.00
	Speed, 100 revolutions per minute.									
No. 7.	Large pointer, to 2 inch (geared, on frame same as No. 2 bolt cutter),	-	-	-	-	-	-	-	-	250.00
	Speed, 75 revolutions per minute.									

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FIG. 326.



COMBINED CUTTING-OFF LATHE AND NUT AND BOLT HEAD FACING MACHINE.

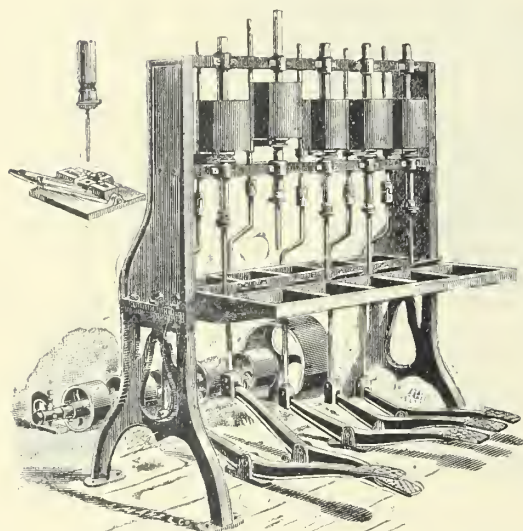
THIS MACHINE is especially adapted to locomotive, engine and tool shops. By a suitable arrangement of the nut arbors, it becomes impossible to square a nut otherwise than at right angles to the axis of the hole. The spindle has $1\frac{1}{8}$ inch hole. Largest step on cone, 12 inches diameter, 4 inch belt. The water used is strained from clips and used again. The saddle is compound, the lower slide being used to adjust the facing tools to proper thickness of nut; the upper one having roughing and finishing tools, the roughing being done by the front tool and the finishing by the back one, which is reversed, thus obviating the necessity of reversing the motion of the machine. The chamfering or rounding is done during the operation of the facing. The capacity of this machine is from $\frac{1}{4}$ to 2 inch nuts, and $\frac{1}{4}$ to 1 inch bolts, inclusive. The first thread is chamfered out by the lever shown at the right. The tailstock spindle can be removed, and by substituting a cutting-off for the facing tool, stock, up to 1 inch diameter, can be cut off as quickly as in a regular cutting-off machine. Each machine is furnished with nine adjustable nut arbors from $\frac{1}{4}$ to $1\frac{1}{2}$ inches, two tool holders, four facing tools, water tank, wrench, and 12 inch friction countershaft, which should make 90 revolutions per minute.

Weight, 1300 pounds. Price, - - - - - \$300.00

Special three-jawed Universal chuck (fitted), - - - - - 35 00 extra.

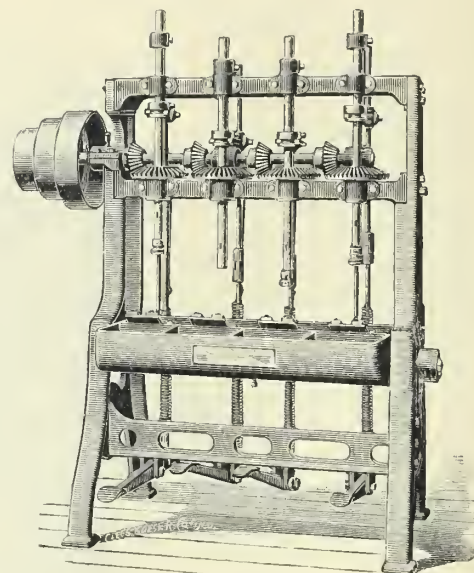
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FIG. 327.



BELT NUT TAPPER. (CLASS B.)

FIG. 328.



SKREW GEAR NUT TAPPER.

BELT NUT TAPPER. (CLASS B.)

SPEEDS, CAPACITIES AND PRICES.

No. 1, 3 spindle, taps to $\frac{3}{8}$ inch; weight, 500 pounds; speed of countershaft, with 14 x 4 inch pulleys, 120 revolutions per minute. Price, with countershaft and three sockets, -	\$115.00
No. 1, 4 spindle, taps to $\frac{3}{8}$ inch; weight, 600 pounds; speed of countershaft, with 14 x 4 inch pulleys, 120 revolutions per minute. Price, with countershaft and four sockets, -	125.00
No. 2, 5 spindle, taps to $\frac{3}{8}$ inch; weight, 900 pounds; speed of countershaft, with 14 x 4 inch pulleys, 120 revolutions per minute. Price, with countershaft and five sockets, -	140.00
No. 3, 3 spindle, taps to $\frac{5}{8}$ inch; weight, 600 pounds; speed of countershaft, with 24 x 6 inch pulleys, 100 revolutions per minute. Price, with countershaft and three sockets, -	125.00
No. 4, 4 spindle, taps to $\frac{5}{8}$ inch; weight, 800 pounds; speed of countershaft, with 24 x 6 inch pulleys, 100 revolutions per minute. Price, with countershaft and four sockets, -	140.00
No. 5, 5 spindle, taps to $\frac{5}{8}$ inch; weight, 1100 pounds; speed of countershaft, with 24 x 6 inch pulleys, 100 revolutions per minute. Price, with countershaft and five sockets, -	165.00
No. 6, 6 spindle, taps to $\frac{7}{8}$ inch; weight, 2200 pounds; speed of countershaft, with 30 x 7 inch pulleys, 55 revolutions per minute. Price, with countershaft and six sockets, -	275.00

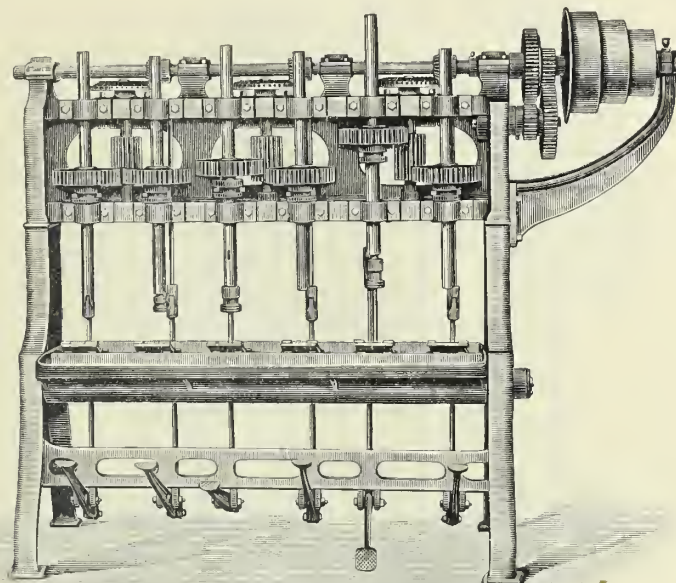
SKREW GEAR NUT TAPPER.

SPEEDS, CAPACITIES AND PRICES.

No. 1, 4 spindle, taps to $\frac{1}{2}$ inch; weight, 1200 pounds; speed of countershaft, with 14 x 4 inch pulleys, 120 revolutions per minute. Price, with countershaft and four sockets, -	\$200.00
No. 2, 5 spindle, taps to $\frac{3}{4}$ inch; weight, 1350 pounds; speed of countershaft, with 14 x 4 inch pulleys, 206 revolutions per minute. Price, with countershaft and five sockets, -	225.00
No. 3, 4 spindle, taps to 1 inch or $1\frac{1}{4}$ inch on 2 spindles; weight, 2000 pounds; speed of countershaft, with 18 x 4 inch pulleys, 240 revolutions per minute. Price, with countershaft and four sockets, -	350.00
No. 4, 6 spindle, taps to 1 inch or $1\frac{1}{4}$ inch on 2 spindles; weight, 2800 pounds; speed of countershaft, with 18 x 4 inch pulleys, 240 revolutions per minute. Price, with countershaft and six sockets, -	400.00

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FIG. 329.



BACK GEARED NUT TAPPER.

THIS style of Nut Tapper is acknowledged by the bolt trade to be the most complete and perfect tapper in the market. The long pinion does away with the feather driving motion, and the power is applied between the bearings on the driven spindles. Any one of the spindles can be stopped independent of the others by treading same out of gear. This tapper can be operated in or out of back gear, giving six changes of speed, and we manufacture it with four and six spindles. The treadles of this machine are supported on the frame, and it is thoroughly self-contained. It also has deep pan, the ends of which are arranged for drawing off water and oil, when a door is opened and chips drawn out.

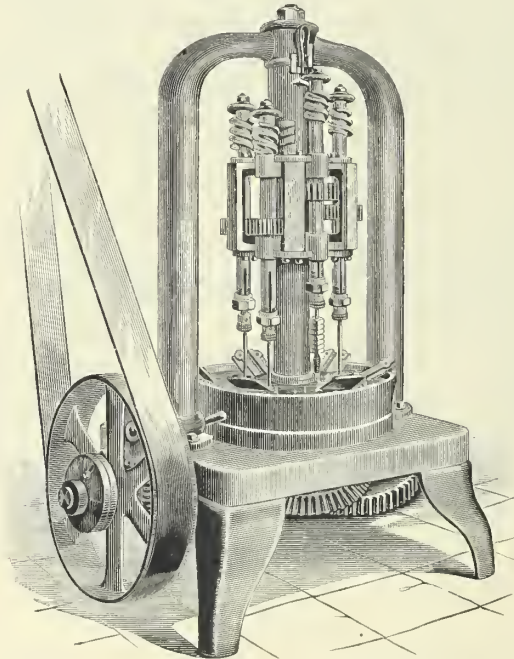
Furnished with "plain," "patent relieving" or "spring" sockets.

SPEEDS, CAPACITIES AND PRICES.

No. 1, 4 spindle, taps to 1½ inch; weight, 2800 pounds; speed of countershaft, with 18 x 4 inch pulleys, 275 revolutions per minute. Price, with countershaft and four sockets, - - - - -	\$500.00
No. 2, 6 spindle, taps to 1½ inch; weight, 3500 pounds; speed of countershaft, with 18 x 4 inch pulleys, 275 revolutions per minute. Price, with countershaft and six sockets, - - - - -	600.00
No. 3, 4 spindle (extra heavy), taps to 2 inch; weight, 3000 pounds; speed of countershaft, with 18 x 4 inch pulleys, 275 revolutions per minute. Price, with countershaft and four sockets, - - - - -	550.00
No. 4, 6 spindle (extra heavy), taps to 2 inch; weight, 3700 pounds; speed of countershaft, with 18 x 4 inch pulleys, 275 revolutions per minute. Price, with countershaft and six sockets, - - - - -	650.00

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FIG. 330.



ROTARY AUTOMATIC NUT TAPPER.

SPEEDS, CAPACITIES AND PRICES.

No. 1, 6 spindle, taps to 1½ inch; weight, 5500 pounds; speed of countershaft, with 30 x 8 inch pulleys, 225 revolutions per minute. Price, with countershaft and six sockets,	-	-	-	-	-	\$850.00
No. 2, 10 spindle, taps to 1 or 1½ inch on six spindles; weight, 7000 pounds; speed of countershaft, with 30 x 8 inch pulleys, 120 revolutions per minute. Price, with countershaft and ten sockets,	-	-	-	-	-	1000.00

This tool is back geared for heavy work, and is a substantial, reliable and strong tapper.

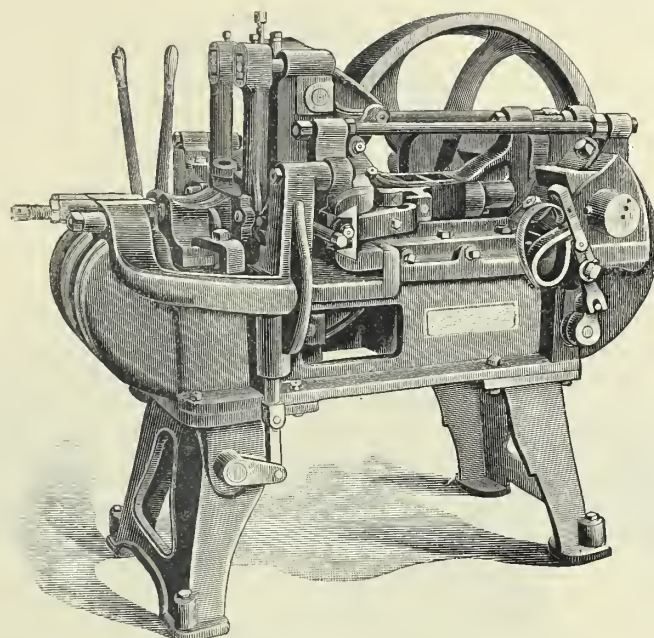
It is made with 6 or 10 spindles.

Furnished with "patent relieving" or "spring" sockets.

The revolving pan or basin is filled with oil or an alkali water, which covers the nut, which keeps it cool and well lubricated.

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FIG 331.



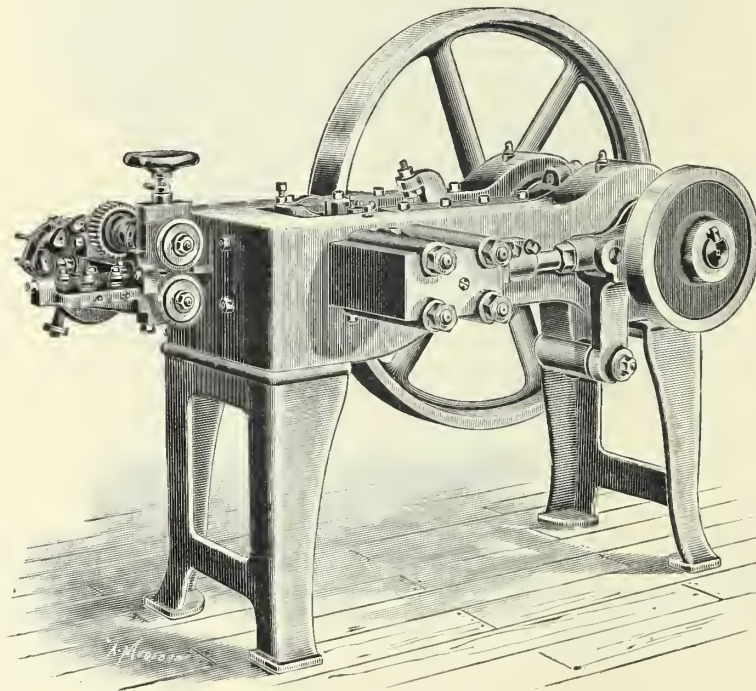
IMPROVED BOLT HEADER.

THIS MACHINE has four hammers working in connection with heading die, all being driven from main crank shaft, and is especially adapted for square and hexagon head bolts, but is capable of making any other styles. It can be operated by any ordinary workman with a few hours' instruction; the operator has simply to insert the blank and start the machine. From four to eight revolutions will produce a perfect head on any square or hexagon bolt, rivets and track bolts being made at one blow. Any length of bolt can be made, and a change from one size to another rapidly executed. The output of one of these machines will run from 2000 to 6000 in ten hours, depending, of course, on the size and form of heads. The iron should be properly heated to avoid any cold shuts under the head. We supply special furnaces when required, to use crude oil, coal or gas. Special attention has been given to proper strength of beds, adjustable liners; bronze bushings and steel castings where required, and our machines having been fully tested are equal, if not superior, to any other make.

- | | | | | | |
|--------|----------------------------------|---------------------------------|------------------------------------|-------------------------------|----------|
| No. 0. | Capacity to $\frac{1}{2}$ inch. | Weight, 2500 pounds. | Speed, 135 revolutions per minute. | Floor space, 5 feet by 3 feet | |
| | 4 inches. | Price, with one size of dies, - | - | - | \$750.00 |
| | | Extra dies, \$12.00 per set. | Countershaft, extra, \$30.00. | | |
| No. 1. | Capacity to $\frac{3}{4}$ inch. | Weight, 3700 pounds. | Speed, 120 revolutions per minute. | Floor space, 5 feet 7 inches | |
| | by 3 feet 7 inches. | Price, with one size of dies, - | - | - | 850.00 |
| | | Extra dies, \$18.00 per set. | Countershaft, extra, \$35.00. | | |
| No. 2. | Capacity to 1 inch. | Weight, 5000 pounds. | Speed, 100 revolutions per minute. | Floor space, 7 feet 8 inches | |
| | by 5 feet. | Price, with one size of dies, - | - | - | 950.00 |
| | | Extra dies, \$20.00 per set. | Countershaft, extra, \$40.00. | | |
| No. 3. | Capacity to $1\frac{1}{2}$ inch. | Weight, 12000 pounds. | Speed, 85 revolutions per minute. | Floor space, 8 feet 4 inches | |
| | by 6 feet. | Price, with one size of dies, - | - | - | 1500.00 |
| | | Extra dies, \$25.00 per set. | Countershaft, extra, \$45.00. | | |
| No. 4. | Capacity to 2 inch. | Weight, 15000 pounds. | Speed, 65 revolutions per minute. | Floor space, 9 feet by 7 feet | |
| | 6 inches. | Price, with one size of dies, - | - | - | 2000.00 |
| | | Extra dies, \$30.00 per set. | Countershaft, extra, \$50.00. | | |

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FIG. 332.



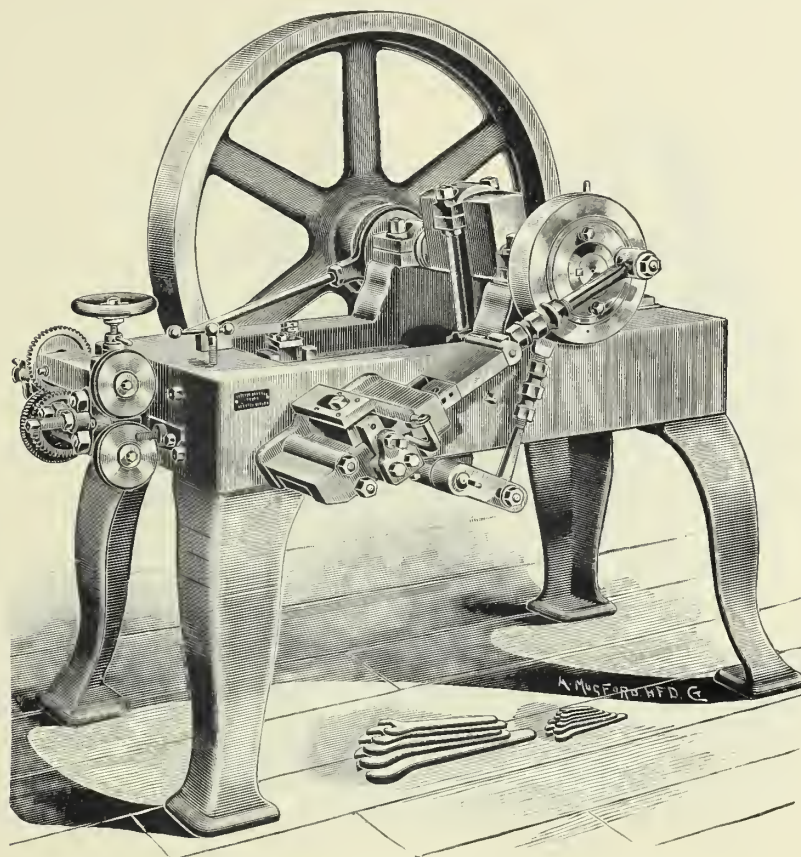
No. 2 OPEN DIE, SINGLE STROKE HEADER.

THESE machines are made throughout of best material; hardened knuckles and plungers, steel punch-holders and steel cams; the die-holders are fitted for each length of rivet, and can be readily removed and replaced by others made for any lengths up to the limit of the machine; the dies are closed and held during the heading by a powerful knuckle-joint actuated by a positive cam motion on the main shaft.

Prices of all rivet machines include necessary wrenches and one set of tools fitted and in working order; countershaft, etc., not included.

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FIG. 333.



SOLID DIE, DOUBLE STROKE RIVET MACHINE.

THE illustration represents the No. 2 size of this class of machine. They are made of the best material, in the most thorough manner, with all necessary adjustments for wear and for different sizes of work. They will work up the ends of the wire, and new pieces of wire can be fed in without stopping the machine. The adjustments for length of rivet and for the length of wire feed can be regulated while the machine is in motion.

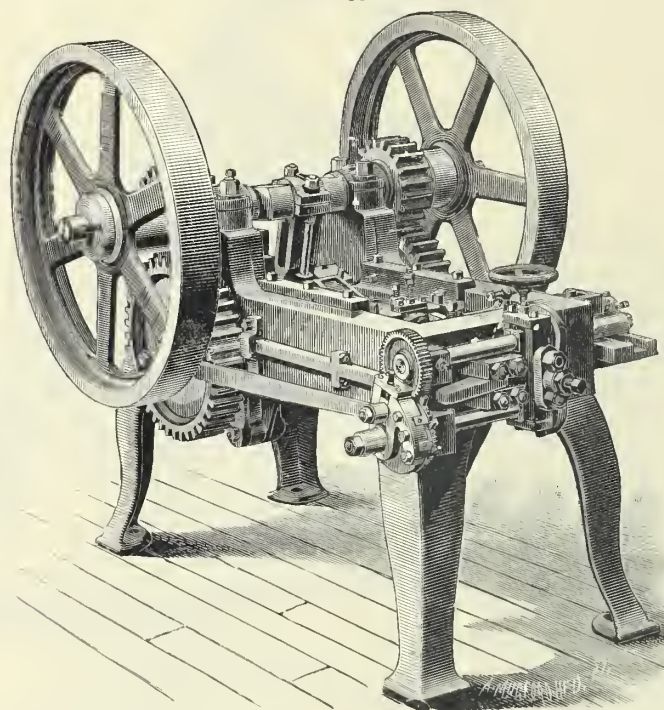
	0	1	2	3
Number of machine, - - - - -	0	1	2	3
Diameter of wire the machine will work, - - -	$\frac{1}{8}$ inch	3-16 inch	$\frac{1}{4}$ inch	$\frac{3}{8}$ inch
Length of rivet the machine will make, - - -	$\frac{3}{4}$ inch	1 $\frac{1}{8}$ inch	1 $\frac{1}{2}$ inches	2 $\frac{7}{8}$ inches
Diameter of fly-wheel, - - - - -	20 inches	36 inches	42 inches	62 inches
Face of fly-wheel, - - - - -	3 $\frac{1}{2}$ inches	4 $\frac{1}{4}$ inches	5 $\frac{1}{2}$ inches	7 inches
Number of revolutions per minute, - - - - -	125	90	75	55
Weight, complete, - - - - -	800 pounds	2000 pounds	3800 pounds	8000 pounds
Price, - - - - -	\$550	\$750	\$950	\$1,600

The prices include necessary wrenches and one set of tools fitted and tested to produce sample work.

Note.—The sizes of wire that machine will work are calculated for iron ; they may be exceeded in many cases, especially for brass and copper work.

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FIG. 334.



SOLID DIE, DOUBLE STROKE, GEARED RIVET MACHINES.

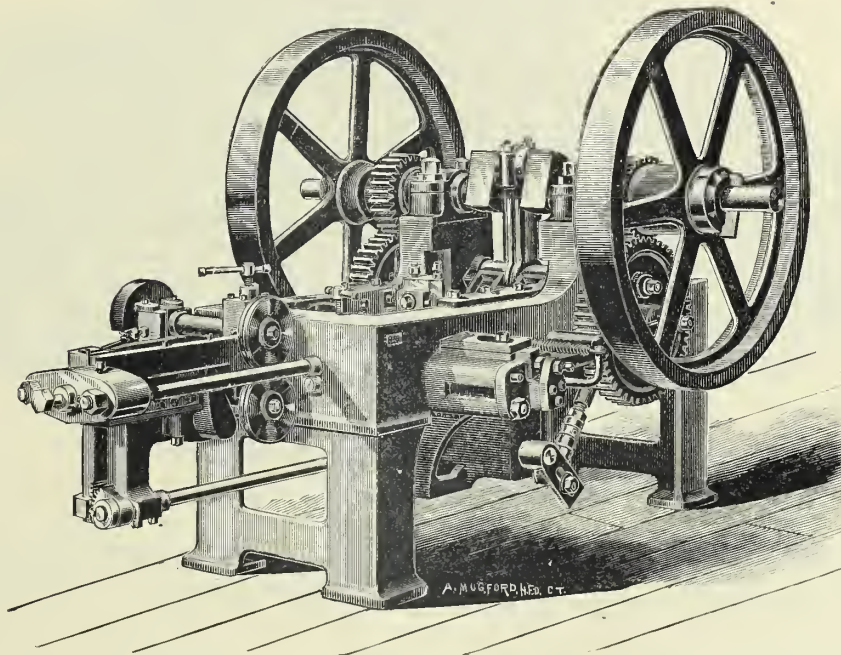
THE illustration represents the No. 2½ size of Solid Die, Double Stroke, Geared Rivet Machines. These machines have independent knock-out motion, will work up all of the wire, and can be adjusted same as the plain machines. Relief motion is described on following page ; the cost of relief fixtures not included in price list.

Number of machine, - - - - -	2½	3½	5
Diameter of wire the machine will work, - - -	5-16 inch	¾ inch	⅝ inch
Length of rivet the machine will make, - - -	2 inches	3¼ inches	4½ inches
Number of rivets per minute, - - - - -	60	50	40
Diameter of fly-wheel, - - - - -	36 inches	50 inches	60 inches
Face of fly-wheel, - - - - -	4½ inches	6 inches	6½ inches
Revolutions of fly-wheel per minute, - - -	120	100	80
Weight of machine, complete, - - - - -	5500 pounds	12800 pounds	21000 pounds
Price, - - - - -	\$1,300	\$2300	\$3,600

The prices include all necessary wrenches and one set of tools fitted and tested.

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FIG. 335.

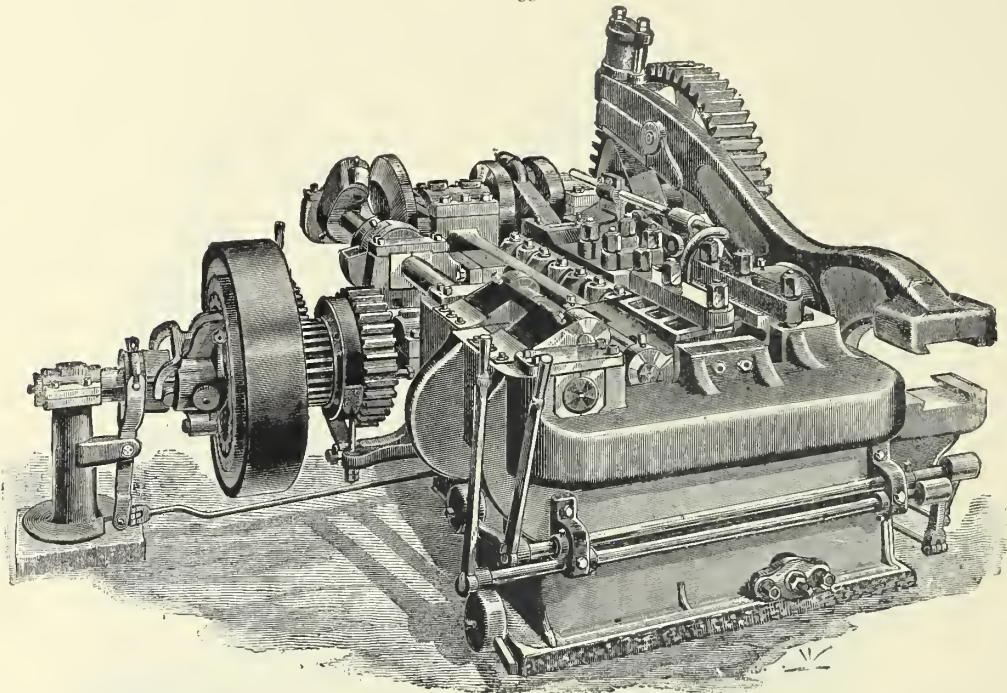


No. 3 1-2 SOLID DIE, DOUBLE STROKE, GEARED RIVET MACHINE.

WE have recently perfected the No. 3½ machine shown in the illustration, and attention is called to the following improvements: The feed and knock-out motions have been revised, and we have added a relief mechanism whereby the end of the knock-out pin, against which the rivet rests when the first blow is struck, is automatically drawn back a short distance—the extent of which can be properly adjusted—and this permits the second blow to drive the rivet further into the die, which in practice enables the machine to easily produce a variety of work that has not heretofore been made by cold heading. All of the gears are cut, and the pinions are of steel. For the price of machines with relief attachments add \$200.00 to the Price List on previous page.

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FIG. 336.



BOLT HEADING, FORGING AND UPSETTING MACHINE. (Class "A.")

This tool, for large upsetting, heading bolts, rivets, car pins, upsetting truss rods, connecting rods, forming eye bars, turn buckles, etc., is the most powerful and economical machine of its class that has yet been offered, and is especially adapted for use in large railroad, forge, bridge and car shops. The features of this machine lie in the suspended rocking die attached to a hinge toggle motion and operated by an eccentric face cam on side shaft.

This does away with the hard, reciprocating movement of the heavy live or movable die box, which, in machines of this size, weighs considerable.

It gives a full center line grip the whole length of the die box.

It has an extremely strong, positive and easy style of toggle movement.

The motion of the eccentric closing cam is very soft and easy.

The three-lobed cam on cushioned lever gives three strokes of same to every revolution of shaft, and is very useful in shaping or finishing work prior to or after upsetting.

The machine is provided with stop motion, and is under the complete control of the operator to start or stop, by use of the hand levers, as shown on the cut, or by treadle with which the machine is provided.

The die box is exceptionally large for upsetting; this has hitherto been a great objection in tools of this style. Any class of work, which can be done with these motions in perfect control, can be made on this machine. In fact, in the hand of an ingenious mechanic it is hard to say what cannot be accomplished with its aid. Often where the machine itself does not finish the work it will shape it for the drop hammer.

The machine is furnished with friction clutch and safety breaker, both of which aid in preventing accidents and breakages.

CAPACITIES, DIMENSIONS AND SPEEDS.

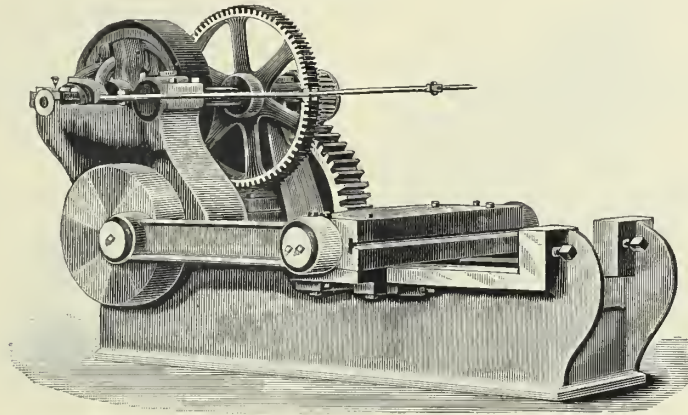
	Capacity.	Die Space.		Stroke.	Opening of Grip.	Stock Gathered	Strokes per Minute	Speed of Fly Wheel.	Fly Wheel.	Weight.	Floor Space.
		Length	Depth								
No. 5, plain	2¼ in.	12	x 8	8½ in.	3 in.	6 in.	60	60	11 x 72 in.	10000	9 ft. x 8 ft.
No. 6, geared	2¾ in.	13½	x 11	11 in.	3 in.	7 in.	40	250	11 x 36 in.	17000	10 ft. 6 in. x 9 ft. 7 in.
No. 7, geared	3½ in.	15	x 17	12 in.	4 in.	8 in.	33	300	10 x 45 in.	32000	14 ft. 6 in. x 13 ft.

PRICES.

	Price, with one size of dies.	Countershaft, Extra.	Cushion Hammer, Extra.	Friction Clutch, Extra.	Friction Clutch with Stop Motion Extra.	Pin Clutch, Extra.	Dies, per set, Extra.
No. 5, plain.....	\$50.00	\$100.00	\$150.00	\$100.00	\$20.00
No. 6, geared.....	60.00	25.00
No. 7, geared.....	75.00	30.00

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FIG. 337.



FORMING, BENDING AND PUNCHING MACHINE.

HAS FRICTION CLUTCH.

THIS simple but useful machine was designed to reduce the cost of bent or formed work over the hand process, where duplicate parts in large numbers and uniformity are required. With dies properly made iron or steel can be formed or bent into almost any shape, forged, welded, upset or punched.

Parties using this style of machine find that it is adapted to many classes of work not thought of when the machine was purchased; this, however, depends largely upon the ingenuity and skill shown in constructing the dies.

The power is transmitted by means of pulley without any balance wheels, which are not necessary in a tool geared so high, and which are liable to cause breakage.

Where the price and the size will warrant, a friction clutch is used, it being easier to open and close than a common pronged clutch. It is also a factor of safety.

The power is finally transmitted to the eccentric by means of a single large pitched central driving gear, giving uniformity of motion to the eccentrics, freedom from danger of outside gears and pinions, and less liability for dirt or chips.

No eight tooth pinions are used.

The crosshead on the large sizes moves in covered, gibbed ways beneath, which are free from dirt and grit, and the crosshead and movable die do not rest at all on the upper surface, but are suspended one-fourth to one-half an inch above. This prevents grit or dirt from interfering with the accuracy of its motion.

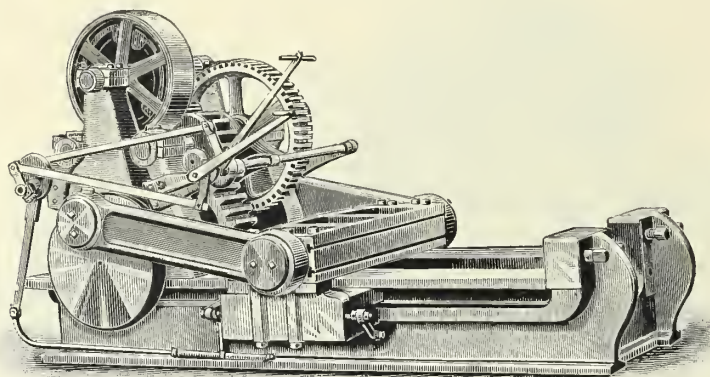
The back supports are high and heavy, and are consequently stronger and better for supporting high dies.

In the large sizes we have a hole through each side of bed for $2\frac{1}{2}$ inch bolts, which nearly double the strength of the bed when required.

The material required to give these results on carefully calculated strains with a factor of safety brings the weight of the No. 5 machine up to 24000 pounds.

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FIG. 338.



No. 5, FORMING, BENDING AND PUNCHING MACHINE.

HAS FRICTION CLUTCH AND AUTOMATIC BACK STOP MOVEMENT.

CAPACITIES AND DIMENSIONS.

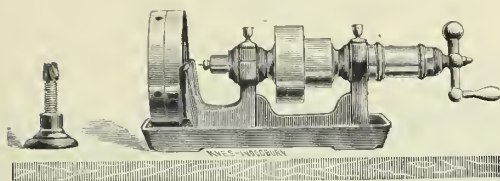
	Length over all.	Width over all	Face Length of Crosshead.	Depth of Crosshead.	Movement of Crosshead.	Space for Dies.	Back Gear.
No. 1, - - - -	6 ft.	36 ins.	24 ins.	5 ins.	14 ins.	14 ins.	7½ to 1
No. 2, - - - -	8 ft.	52 "	36 "	7 "	16 "	28¾ "	26 to 1
No. 3, - - - -	10 ft.	62 "	44½ "	8 "	17 "	26½ "	35 to 1
No. 4, - - - -	10 ft.	69 "	54 "	8 "	18 "	38 "	45 to 1
No. 5, - - - -	12 ft. 6 in.	78 "	60 "	10 "	20 "	39 "	51 to 1

SPEEDS AND PRICES.

	Strokes per Minute.	Speed of Driving Pulley.	Driving Pulley.	Weight.	Floor Space.	Friction Clutch, Extra.	Friction Clutch with Stop Motion, Extra.	Price without Dies.
No. 1, - - - -	15	120	30 x 6 ins.	3500 pounds	3 ft. 4 ins. x 6 ft.			
No. 2, - - - -	12	320	28 x 6 "	6000 "	4 ft. 11 ins. x 8 ft. 4 ins.			
No. 3, - - - -	10	350	30 x 6 "	11000 "	5 ft. 3 ins. x 9 ft. 10 ins.	\$100.00	\$150.00	
No. 4, - - - -	8	200	30 x 8 "	15000 "	6 ft. 8 ins. x 12 ft. 4 ins.	100.00	160.00	
No. 5, - - - -	6	300	30 x 8 "	22500 "	6 ft. 8 ins. x 12 ft. 4 ins.	100.00	175.00	

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FIG. 339.



CENTERING MACHINE, No. 1.

This machine is designed for centering and drilling round iron preparatory to working it in a lathe. It is a combination of a universal scroll chuck, for holding the work, with a traversing spindle carrying a drill, two being so arranged as to be perfectly central.

At one operation it will center and drill any size of round iron, from $\frac{1}{4}$ to 3 inches in diameter. The spindle is fitted with a split chuck for holding a $\frac{1}{8}$ inch twist drill, which may be ground if broken, and replaced when used up, with but little trouble.

The machine is supplied with cups for oil to lubricate the bearings, and stands in an iron pan for the reception of the oil and chips from the drill. The accuracy and dispatch with which it performs its work, combine to render it a very desirable tool for every machine shop.

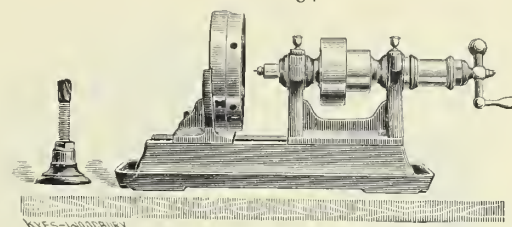
Machines with four jaws, for holding square iron, are made to order.

PRICES.

Complete, including split drill chuck, twist drill, and rest for end of bar, - - - - -	\$50.00
With four-jaw chuck, - - - - -	54.00
Mounted on iron table, - - - - -	75.00
Countershaft, with tight and loose pulleys, 6-inch diameter by 2-inch face, extra, - - - - -	9.00

Countershaft should make about 400 revolutions per minute.

FIG. 340.



CENTERING MACHINE, No. 2.

This is a larger and heavier machine than the No. 1, and will center iron from $\frac{1}{4}$ inch to 4 $\frac{1}{2}$ inches diameter. It is set on a bed about 2 feet long, and the chuck is bolted to a separate stand, which is fitted to the bed and can slide 5 inches, thus giving more or less room between the work and drill as required.

Machines with four jaws, for holding square iron, made to order.

PRICES.

Complete, same as No. 1, - - - - -	\$68.00
Complete, with four-jaw chuck, - - - - -	72.00
Mounted on iron table, - - - - -	93.00
Countershaft, same as No. 1, extra, - - - - -	9.00

CENTERING MACHINE CHUCKS.

Universal Scroll Chucks, having steel scrolls and jaws, the same in all respects as those used with corresponding numbers of centering machines, will be furnished separately when desired. They are very useful for holding large rods or pipe while being threaded in machines, and in all places where a chuck having a very large hole, as compared with its outside diameter, is required.

PRICE LIST.

	Thickness.	Outside Diameter.	Diameter of Hole.	Price, 3 Jaws.
No. 1,	2 $\frac{1}{2}$ inches.	8 inches.	3 $\frac{1}{4}$ inches.	\$18.00
No. 2,	2 $\frac{1}{2}$ "	9 $\frac{3}{4}$ "	4 $\frac{1}{2}$ "	21.00
No. 3,	2 $\frac{1}{2}$ "	10 $\frac{3}{8}$ "	5 $\frac{1}{2}$ "	24.00
No. 4,	3 "	14 $\frac{1}{2}$ "	7 $\frac{1}{2}$ "	30.00

STANDS OR TABLES FOR CENTERING MACHINES.

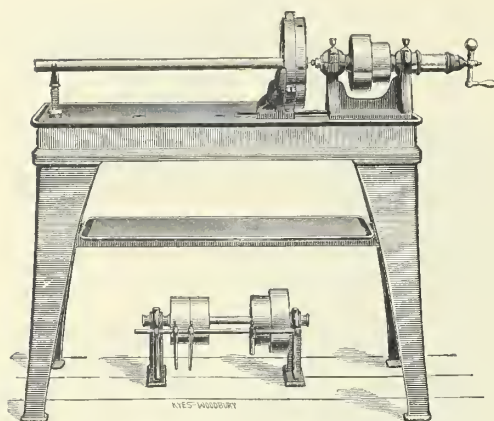
Patterns have been made for a table upon which to mount No. 1 and No. 2 machines when desired.

Cuts for illustrating this table are not yet ready, but it is of very neat design, and is conveniently adapted for mounting our machines, or for any similar purpose. It is planed true on the top and has a narrow trough around all sides to catch oil or chips. It is 30 inches long by 14 inches wide, and weighs 175 pounds. These tables are supplied with the No. 1 or No. 2 machines, mounted complete, or we furnish them singly, if desired.

Price, - - - \$25.00

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FIG. 341.



CENTERING MACHINE, NO. 3.

This is still larger than No. 2, having a capacity of from $\frac{1}{4}$ to $5\frac{1}{2}$ inches; is set on a bed three feet long with iron legs; is furnished with counter and hangers complete. The chuck can slide on the bed eighteen inches, giving ample room for any work required.

Machines with four jaws, for holding square iron, made to order.

PRICE.

Complete, same as No. 1.	-	-	-	\$100.00
With four-jaw chuck,	-	-	-	105.00
Countershaft, same as No. 1, included.				

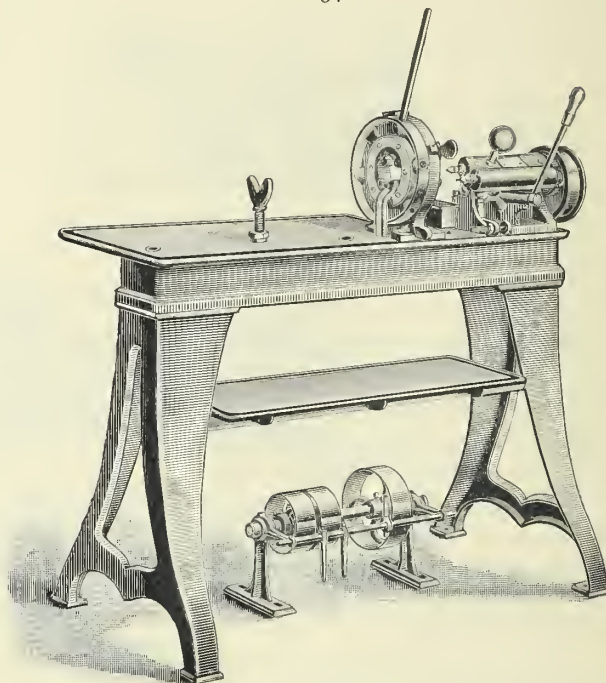
CENTERING MACHINE, NO. 4.

The No. 4 machine is made only to order, being designed for heavy work, as locomotive and car axles. It will center shafts $7\frac{1}{2}$ inches in diameter. In appearance it resembles the No. 2 machine, but is much larger and heavier.

PRICE.

Complete, including countershaft,	-	-	\$125.00
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FIG. 342.



NEW TWO SPINDLE CENTERING MACHINE.

GENERAL DESCRIPTION.

THE machine illustrated is the result of careful study, and embodies important improvements over all others of its class. It has

Two sensitive balanced spindles for drilling and reaming at one setting of the work.

Great convenience in the feeding device and lateral movement of the head.

Positive stops, so arranged as to secure perfect uniformity in the depth of work, and to absolutely prevent counter-sinking too deep, even by the most inexperienced operative.

Positive locking device for head. The spindles cannot be advanced except at the central point, and when advanced no lateral movement can occur.

Improved form of vise, easily kept true and in perfect alignment with spindles.

Rests for each end of work, so arranged that the workman does not have to support the weight of the bar while guiding it into the vise.

Improved oiling device, for cutting tools.

Ample shelf and table room, the convenience of which will be readily appreciated.

Countershaft has T. & L. pulleys, 6 inches diameter by 2 inch face, and should make about 500 revolutions per minute.

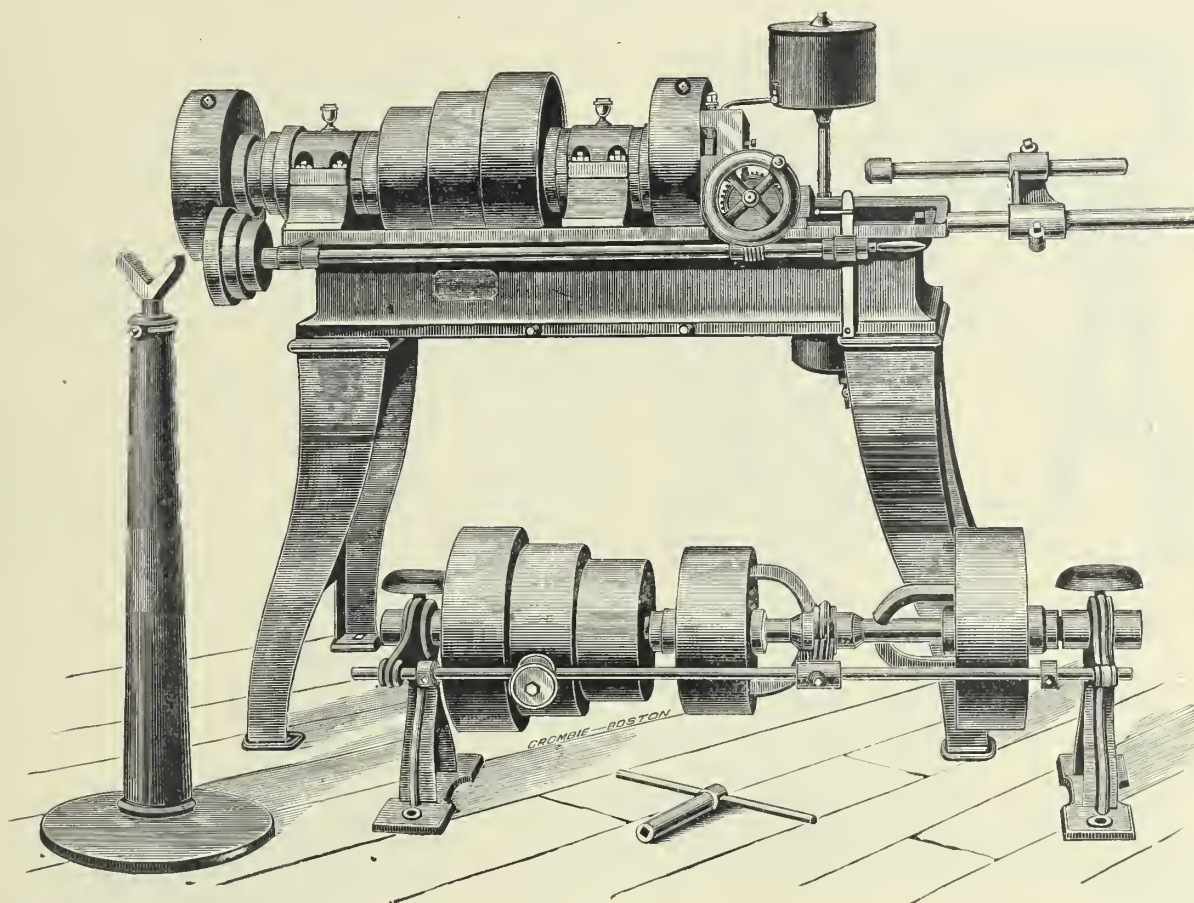
Machine weighs about 450 pounds and occupies floor space 26 x 54 inches.

Capacity, $\frac{1}{4}$ to 4 inches.

Price, \$125.00.

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FIG. 343.



CUTTING-OFF MACHINE.

THIS MACHINE possesses many points of superiority that will be appreciated by the practical mechanic. The spindle bearings are large and long, the cones are of ample width and diameter. There are two strong and powerful chucks—one on each end of the spindle—designed and constructed expressly for this machine. The jaws do not project, consequently the cutting tool can be kept very close to the face of the chuck, thereby avoiding the usual leverage and strain on chuck and spindle bearings. A special feature of this machine is the tool-post or holder, which is of extraordinary strength and stiffness, and is provided with two lateral adjusting screws, so that after once setting the tool perfectly true and square, it can be removed for grinding and replaced in exactly its original position without loss of time and without changing its distance from the length gauge. There is an automatic throw-off, which stops the feed when the piece is cut off, and proves to be a very desirable attachment. The length gauge is provided with a finger at its forward end, which can be thrown over, after gauging the length, to prevent cramping the tool as the piece drops off. The countershaft has two changes of speed, making, with the changes on the cone, six different speeds for the main spindle. The pulleys on the countershaft are driven by a simple and efficient clutch, so that by an instantaneous movement of the lever the speed may be accelerated as the tool approaches the center.

2 1-2 Inch Machine. All sizes under 2½ inches can be cut in this machine. A "Slate" cutting-off tool and an adjustable stand for the support of long bars are provided with each machine. Each machine is thoroughly tested before delivery, and we warrant them first-class in every respect. Friction pulleys on countershaft 12 inches and 10 inches diameter, 4 inches wide, and should run 70 and 100 turns per minute.

Price of machine and overhead work, \$225.00. Weight, about 900 pounds.

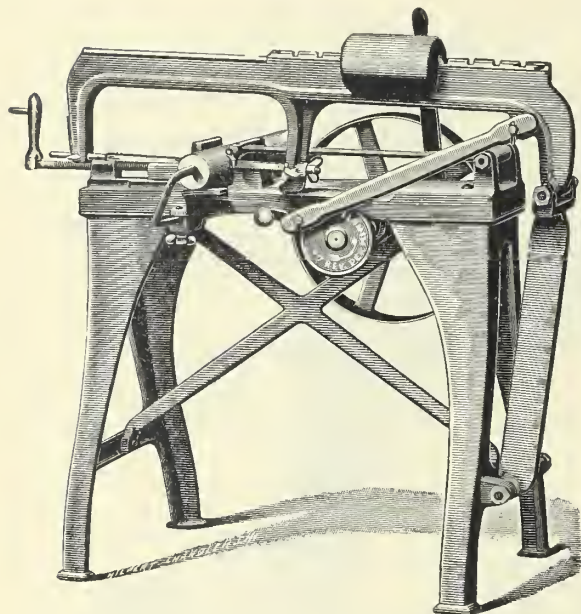
4 1-2 Inch Machine. The driving cone has four changes, which, with the two speeds provided by pulleys on the countershaft, gives eight different speeds to the main spindle, varying from 13 to 100 revolutions per minute. The main spindle has bearings 6½ inches diameter, 7 inches long. There is an automatic throw-off, which disengages the feed when the piece is cut off. The countershaft has two pulleys, driven by a simple and efficient clutch, so that by an instantaneous movement of the lever the speed may be accelerated as the tool approaches the center. Slate's patent cutting-off tool, and an adjustable stand for the support of long bars, are furnished with each machine. The driving pulleys on countershaft are 10 inches and 12 inches diameter, 4 inch face, and should run 100 and 200 turns per minute, respectively. Width of steps on cones, 3¼ inches.

Price of Machine, complete, \$425.00. Weight, 1700 pounds.

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FIG. 344.

No. 1 AUTOMATIC POWER METAL SAW.



THIS SAW is designed for cutting off iron, steel, and all kinds of metals up to 6 x 8 inches, round or square. In this machine a steady and uniform pressure on the saw is maintained on the entire forward stroke, while on the return the greater part of the pressure is removed. It is a well known fact that a hack saw or file may be ruined in a very short time by pressing too hard on the return stroke; the teeth are made to cut in one direction only.

No skill is required to operate it. Any unskilled workman can run it. The only attention required is to secure the work in the vise and set the machine in motion, and when the bar is cut off, (leaving the ends true and in nice shape for centering) the saw automatically lifts from the work and stops. This saw also cuts tubing or pipe up to 8 inches.

SPECIFICATIONS.

Revolutions per minute,	-	-	-	-	40 to 50
Size of belt,	-	-	-	-	2 inches
Length of stroke,	-	-	-	-	6 inches
Floor space occupied,	-	-	-	-	18 x 30 inches
Length of blades,	-	-	10, 11, 12, 14 and 16 inches	-	
No. 1 machine cuts off any size to	-	-	-	-	4½ inches
" 2 " " " " "	-	-	-	-	6 x 8 inches

Full directions accompany each machine.

THE LEADER METAL SAWING MACHINE.

ENTIRELY AUTOMATIC.

WITH this machine several pieces may be clamped together and cut off at any angle as well as if they were one solid piece. An Automatic Tension is also provided which permits of adjustment of metals of various densities, this being accomplished by setting the weight forward or backward on the lever to suit the class of work operated upon.

The adjustment of the weight also controls the blade for rapidity of cut, as when the frame has advanced, and made a cut, it is lifted slightly, freeing the blade during the return stroke, thus preventing the teeth from dragging; upon completion of back stroke the frame descends and is ready to make a new cut. It will be readily seen that the life of the blade is lengthened 50 per cent.

A pivoted vise, similar in design to a planer chuck, is employed to hold the work, thus enabling the user to cut off pieces at any angle from 45 to 90 degrees.

A table-like projection is added to the bed below the vise to prevent a partly detached piece from dropping to the floor; therefore the section when sawed through will remain on the shelf.

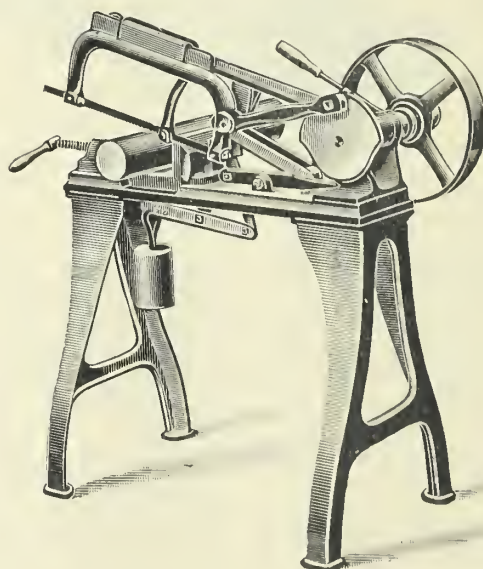
The saw clamps, adjustable for a blade up to 12 inches in length, are so arranged that the straight running of the blade is insured.

A gauge for regulating the length of pieces to be cut is a valuable fixture which is included.

An extra saw guide is provided with the machine and may be attached to the frame guide by a thumb screw if needed. This will be of benefit when very thin sections are to be cut off, but it is not necessary for ordinary work as the blade runs well enough without it.

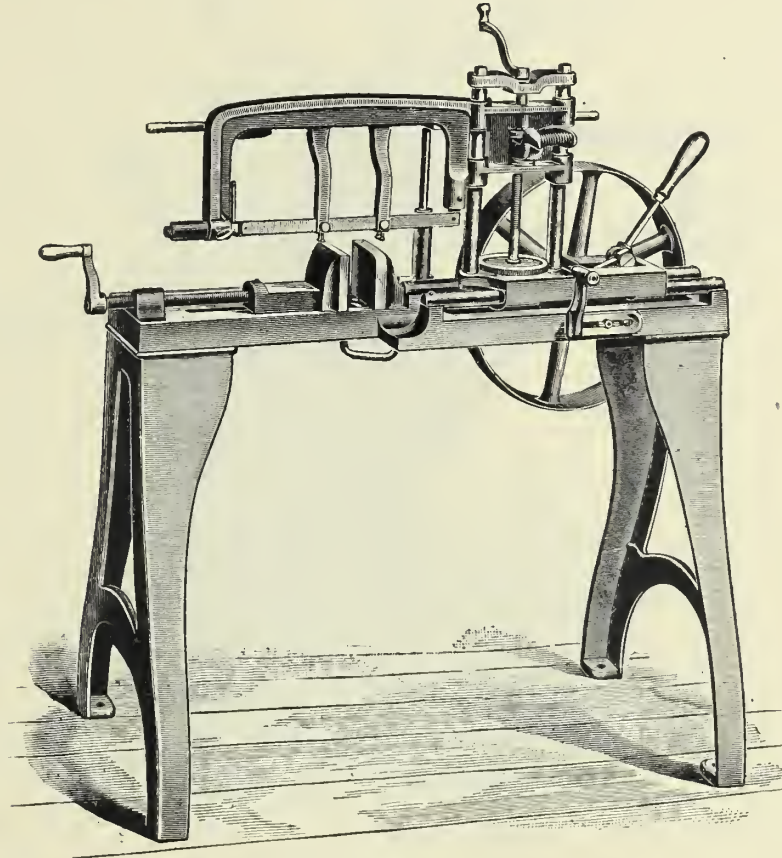
The shaft bearing is bushed, consequently the wear comes on the bushing and not on the bearing, and as it is bored and turned to a standard size in case of wear it may be replaced at slight cost. The saw should be run at 40 strokes per minute.

FIG. 345.



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FIG. 346.



SHOP SAW, WITH AUTOMATIC FEED.

CAPACITY FIVE INCHES AND LESS.

THIS Shop Saw is a great improvement over the gravity feed; has positive feed, entirely automatic, and speed can be changed instantly, to accommodate all classes of work. The saw has automatic screw feed; the same cutting speed is maintained throughout; the saw clears the metal on return stroke, effecting an actual saving of 50 per cent. of wear, a single blade lasting from three days to two weeks.

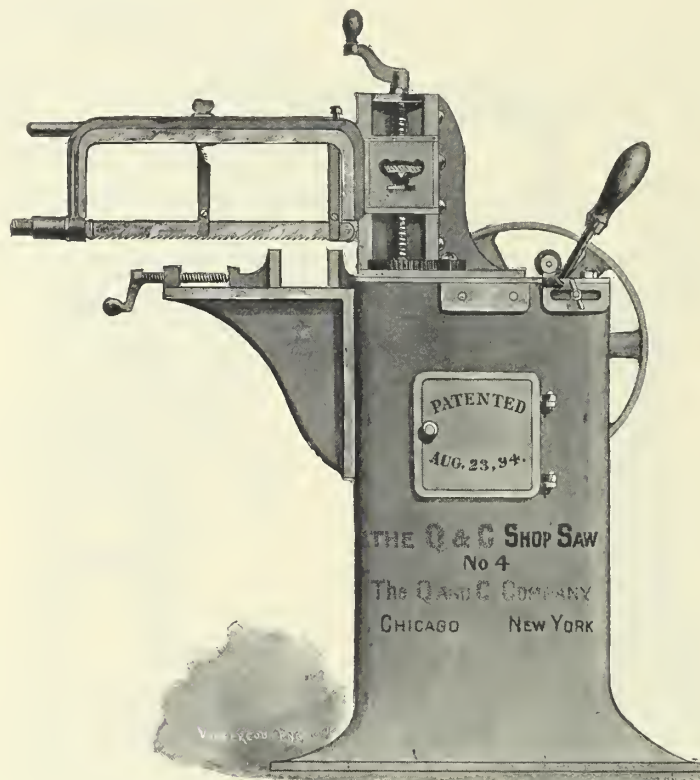
These machines are supplied with movable vise, allowing use of entire blade; also double adjustable guards to hold the blade firmly, insuring true work.

Price of Shop Saw, including six special saw blades, \$25.00.

Each machine fully guaranteed.

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FIG. 347.



SHOP SAW No. 4.

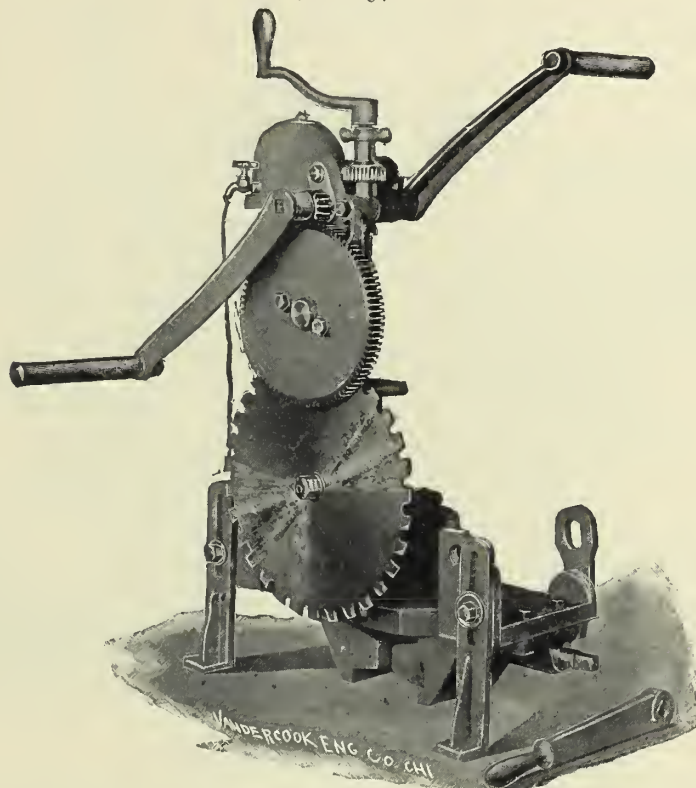
THIS MACHINE is constructed similar to an ordinary shaper. It has a cabinet base, which can be used as a receptacle for tools, etc. It is 21 inches high to the work table, and occupies a floor space of 1 x 2½ feet. It is run by a 3 inch belt direct from main shaft on to a 14 inch pulley on machine. It takes the place of expensive cutting-off machines, as it leaves the ends of the work square and smooth, ready to receive the lathe centers. This machine has patented automatic feed, of great range, which can be changed from fast to slow instantly without stopping. Being entirely automatic in its operation, requires little or no attention when cutting, and can therefore be used in conjunction with other machines by the same operator. The saw blades are extra heavy, and will not break under severe strain. The stroke of the saw blade is perfectly horizontal and does not drag back on the work, giving long life to the blade. In fact, the cost of operating this machine on ordinary work is so little as to save its entire cost in a short time over any other method of cold sawing.

A boy can operate ten of these machines. The latest machine out. The cheapest Shop Saw built. This will save an expensive cutting-off machine.

Sold complete, with three extra heavy saw blades.

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FIG. 348.



No. 5 PORTABLE SAWING MACHINE.

16 INCH BLADE, WITH AUTOMATIC FEED.

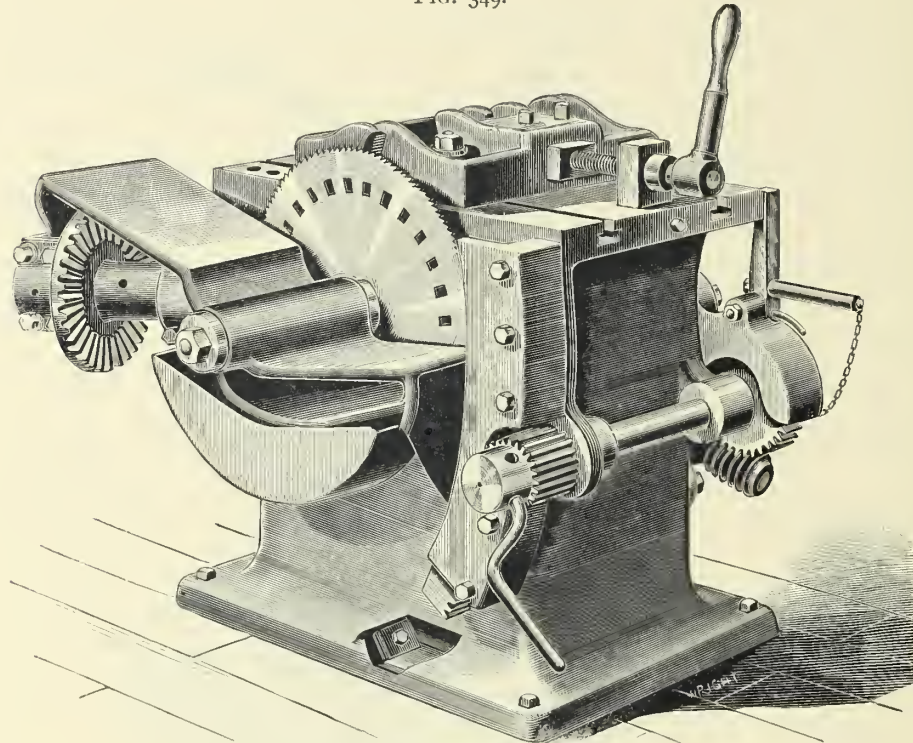
THIS machine is designed especially for steam and street railroads; it will cut rails, beams, channels, etc., up to seven inches in height, and at an angle up to and including 45° . It is generally operated by two men, but can be by one, as the great decrease of power required is explained by the fact that the power is applied directly to the periphery of the saw blade, which enables the operator to get the greatest amount of power possible with the least exertion. With this machine continuous cutting can be done with little effort, owing to its ease of action. Steam rail can be cut in from six to twelve minutes. The saw blade being hollow ground and acting as a rotary planing cutter, it leaves the rail perfectly smooth and true. An accuracy of $\frac{1}{100}$ of an inch can be obtained. It is an indispensable tool to all track men. It is especially valuable in cutting off rail ends. It is of great value in making crossings and switch lay-outs on account of its ability to cut angles. It is well and strongly built, all feed gears, etc., being cut from solid steel; is equipped with an automatic feed and quick release, and can be attached to a rail in thirty seconds. It is furnished complete with two saw blades securely boxed and ready for work. Weight of machine, 260 pounds; boxed, 300. Prices upon application.

No. 6. A Special Size made for 9-inch Street Rail. $20\frac{1}{2}$ -inch Blade.

OWING to the success of No. 5 machine, described above, we offer a larger size called No. 6. This machine is an exact duplicate of the No. 5 in regard to the principle and construction, but uses a $20\frac{1}{2}$ -inch instead of a 16-inch saw blade; and is designed especially to meet the wants of street railroads and contractors where it is necessary to cut rails, etc., up to and including nine inches in height, and up to a 45° angle. The machine, being somewhat heavier than the No. 5, is arranged so as to be carried easily by two men. Furnished with two saw blades, complete, and securely boxed. Weight, 385 pounds; boxed, 430 pounds. Prices on application.

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FIG. 349.



MEDIUM TABLE SAW No. 2.

FOR general use in mills, foundries and machine shops where miscellaneous cutting is required. This cutter requires but about ten square feet of floor space and can be operated by any ordinary workman. Gears and pinions hard cast steel, and all parts strong and serviceable. Saws accurately at angles or cross-cut and is a very rapid cutter. In successful operation in the leading rail mills of the country.

Weight of machine,	- - - - -	1200 pounds
Size of table,	- - - - -	2 feet x 2½ feet
Speed of pulley,	- - - - -	200 revolutions
Feed,	- - - - -	Automatic, self-adjusting tension
Power required,	- - - - -	3 horse power
Capacity to cut 4 inch sections round or square, 12 inch I beams, channels, girders, rails, &c.		

TABLE MACHINE "CAMBRIA."

Weight,	- - - - -	about 2100 pounds
Size of saw,	- - - - -	either 18 inches or 20 inches
Size of table,	- - - - -	about 2½ feet x 2½ feet
Capacity to cut 6 inch round or square sections, 15 inch T beams, channels, girders, rails, &c.		
Power required,	- - - - -	3 horse power
Feed,	- - - - -	Automatic, self-adjusting tension

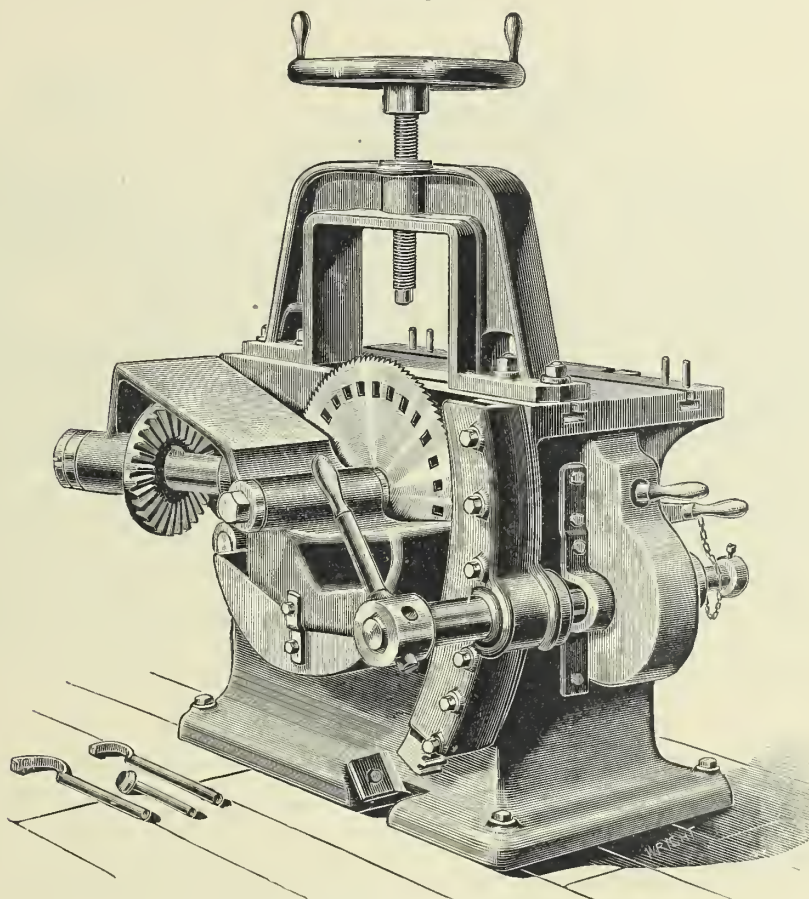
Made in every respect first-class, with hardened shear steel gears and pinions. Designed for cutting 15 inch I beams or channels, tees, rails and girders or other metal sections. Accurate as a mitre cutter. 12 inch I beams can be cut at 45° on this table.

A very rapid cutter and requires but little space for operation. Working principle same as explained in "Medium Table Machine No. 2."

Delivery in six weeks from receipt of order.

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FIG. 350.



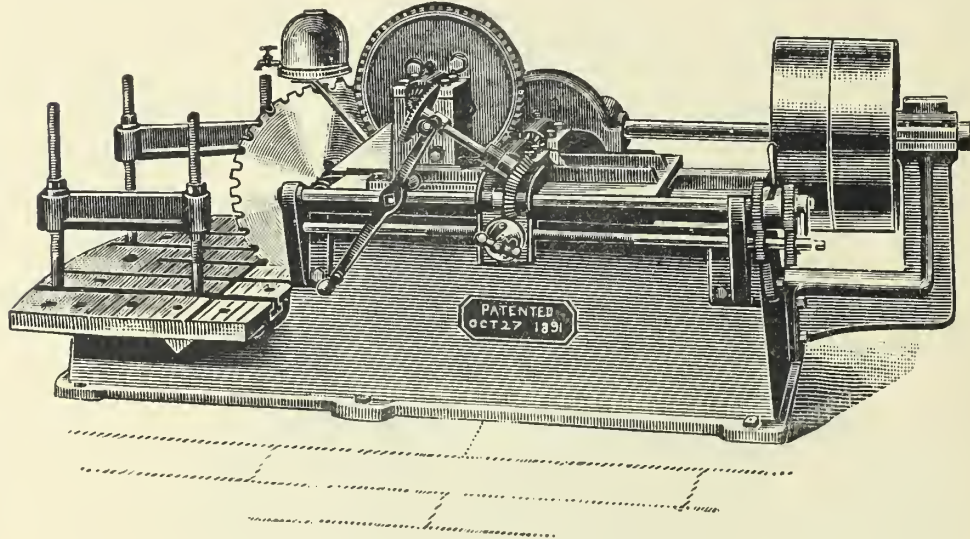
LARGE TABLE MACHINE No. 1.

INTENDED for frog and switch, bridge and architectural work when long, straight or angle cuts are required, and for heavy sections or rails, beams and channels. Has steel gears, hard shear steel sprocket wheel. All protected in machine frame and out of way of operator. Made of best material and guaranteed in every respect.

Weight of machine,	- - - - -	4300 pounds
Size of table,	- - - - -	3 feet x 7 feet
Size of pulley,	- - - - -	24 inches
Velocity of pulley,	- - - - -	75 revolutions
Saw carriage travels,	- - - - -	42 inches
Feed, automatic ; self adjusting tension, from	- - - - -	1 inch to 2½ inches per minute
Power required,	- - - - -	5 horse power
Capacity,	- - - - -	40 x 1 inch ; 36 x 8 inches, or 9-inch sections, round or square

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FIG. 351.



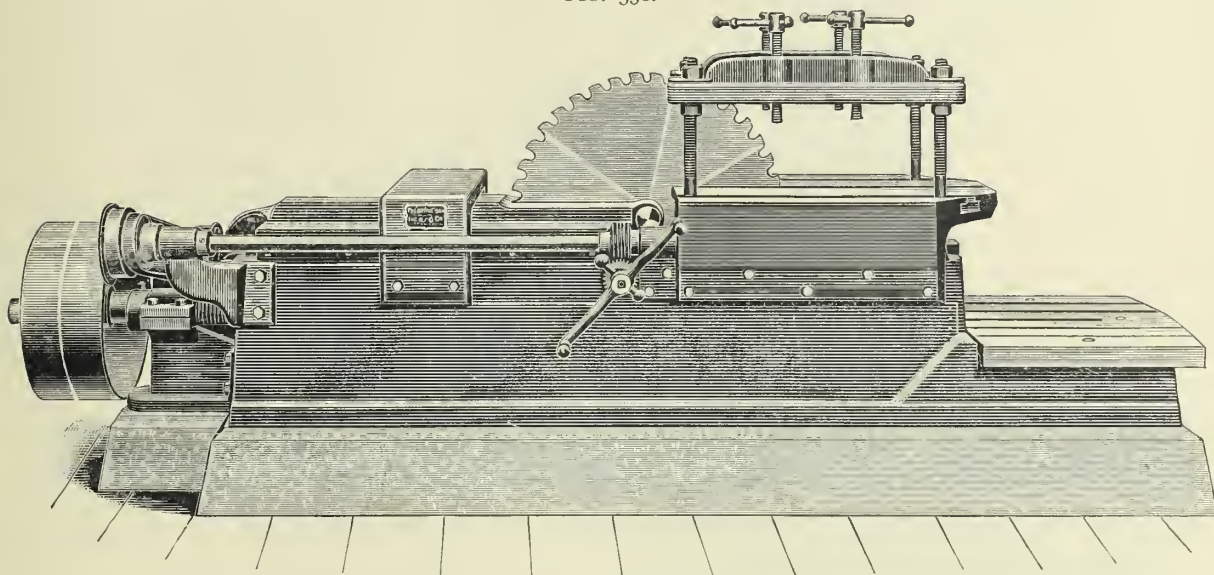
No. 10 POWER SAWING MACHINE.

20½ INCH BLADE, WITH AUTOMATIC FEED, THREE SPEEDS, ADJUSTABLE TO LIGHT OR HEAVY WORK.

THIS MACHINE has been reconstructed and improved, and is now recognized as the most substantial and valuable cold saw in the market. It has greater capacity than any other cold saw sold for more than twice its price, and is sold under our guarantee of satisfactory results or no sale. This machine is designed to belt direct from main shaft, being equipped with tight and loose pulleys, and no countershaft is necessary. It can be equipped with a small engine, on carriage, if desired. It is furnished with an automatic feed of three different speeds, enabling the operator to change the cutting speed at will, to accommodate light or heavy work. It is especially valuable on all classes of architectural work, cutting beams, channels, girders, etc., either square or mitre, making a perfect joint faster than any other known method. It is also used extensively in frog and switch works, rolling mill forge works, and, in fact, wherever cold sawing is necessary. Its capacity is straight cuts of 18 inches or less, and mitres up to 15 inches. It is 5½ inches from bottom of carriage to upper table, and 8 inches to lower table, making it possible to cut forgings, etc., from 5½ inches to 8 inches thick, or less, without turning. It is furnished complete, with oil tanks, adjustable clamping device, wrenches, special grinding machine, and two 20½ inch saw blades. Further particulars as to details, testimonials, etc., can be had upon application. This machine generally requires about 2-horse power. For light work a ½-horse power electric motor is sufficient. Floor space occupied, about 2 x 6 feet. Size for shipment, 2 feet by 6 feet by 2 feet 6 inches. Weight, including casing, 2400 pounds. The great decrease of power required is explained by the principle not before used on any such machine, whereby the power is directly applied to the saw blade on its periphery. Furnished with automatic and adjustable feed. Adjustable table for all kinds of work. Work always true and with fine feed as smooth as if planed. Mitred joints made perfect.

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FIG. 352.



METAL-SAWING MACHINE, NO. 20.

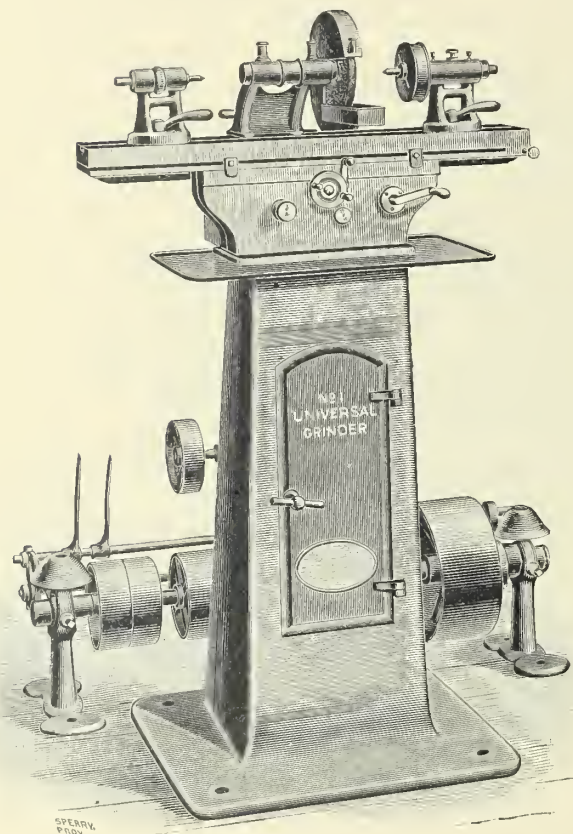
THIS machine has a capacity of 36 x 12 inches. It will also cut any angle, as our special clamping device is arranged to hold work in any way. It will make mitre cut up to 24 inches, and is invaluable for large architectural work, forgings, rolls, etc. It is a very powerful machine, being compound geared, substantially constructed, and is furnished with a false table (not shown in cut) for extra large work. For rail sawing several can be placed on machine at once, making a great saving of time. It is complete, with automatic chain feed, fast and slow, which can be instantly changed by the operator. It also has tight and loose pulleys for 5-inch belt, and is designed to run direct from the main shaft. Each machine is furnished with two 30-inch saw blades and our special grinding machine shown. Further particulars and details upon application. Power required, from two to four-horse; floor space, $2\frac{1}{2}$ x 12 feet.

Owing to the splendid success of this machine on all classes of work, and a call for a similar machine of larger capacity, we are prepared to furnish a special machine with 32-inch blades instead of 30-inch, to cut 14 inches of solid metal without turning the work. We shall be pleased to give further information.

Weight, 5000 pounds. Capacity, 36 x 12 inches.

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FIG. 353.



No. 1 UNIVERSAL GRINDING MACHINE.

GENERAL DESCRIPTION OF DIAMOND UNIVERSAL GRINDERS.

THIS machine is specially adapted for grinding straight or taper, soft or hardened spindles, arbors, cutters, reamers, etc., and it can also be used for grinding rings, hardened boxes, etc., by means of a special chuck which can be furnished. The wheel spindle, head stock and foot stock spindles are all of steel, carefully ground and run in bronze boxes adjustable for wear, and protected from emery dust.

The wheel stand slide swivels and has a graduated base. The end of spindle is drilled to take taper mandrel for carrying small wheel for facing work. The head is removed when the internal grinding fixture is used. The wheel stand may be moved to the work transversely by hand wheel graduated to thousandths of an inch on diameter of the work. It has an adjustable stop so that wheel may be run back and brought up to same place as before.

The sliding table carries a swivel table turning upon a center pin. The swivel table is provided with tangent screws in order to set it accurately, and has scales graduated to read $4\frac{1}{2}$ degrees each side of the center line, and to 2 inches taper per foot for No. 1 machine; 4 degrees, $1\frac{1}{2}$ inches taper per foot for machines Nos. 2 and 3. This arrangement allows tapers to be ground without throwing the head and foot stock out of line.

The sliding table may be fed in either direction by hand or automatically, the amount of travel being controlled by dogs which engage a lever on the front of the machine. The slides are carefully scraped to straight surfaces and are completely protected from emery dust.

The head stock is clamped to swivel table. It swivels and has a graduated base, and may be set at right angles for grinding work on face plate or chuck, or at any degree for grinding centers. The front end is threaded and fitted with a No. 1 Morse taper hole. If work is to be ground on dead centers, the spindle may be locked and the work revolved by means of pulley on front end of the spindle. There is a special device for taking up the wear.

The foot stock is clamped to swivel table. The spindle is adjusted by a screw, and a spring is provided to adjust the spindle, if the work expands. The spindle has a No. 1 Morse taper hole. An automatic pump and connections to use water upon the work is provided when ordered.

SPECIFICATIONS.

Machine receives work,	-	-	-	-	-	-	-	-	16 inches long, 8 inches diameter
Length of traverse,	-	-	-	-	-	-	-	-	20 " " " "
Height from floor to center spindle,	-	-	-	-	-	-	-	-	43 " " " "
Size of base,	-	-	-	-	-	-	-	-	26 inches x 28 inches
Emery wheel,	-	-	-	-	-	-	-	-	8 " diameter, 3 inch hole.

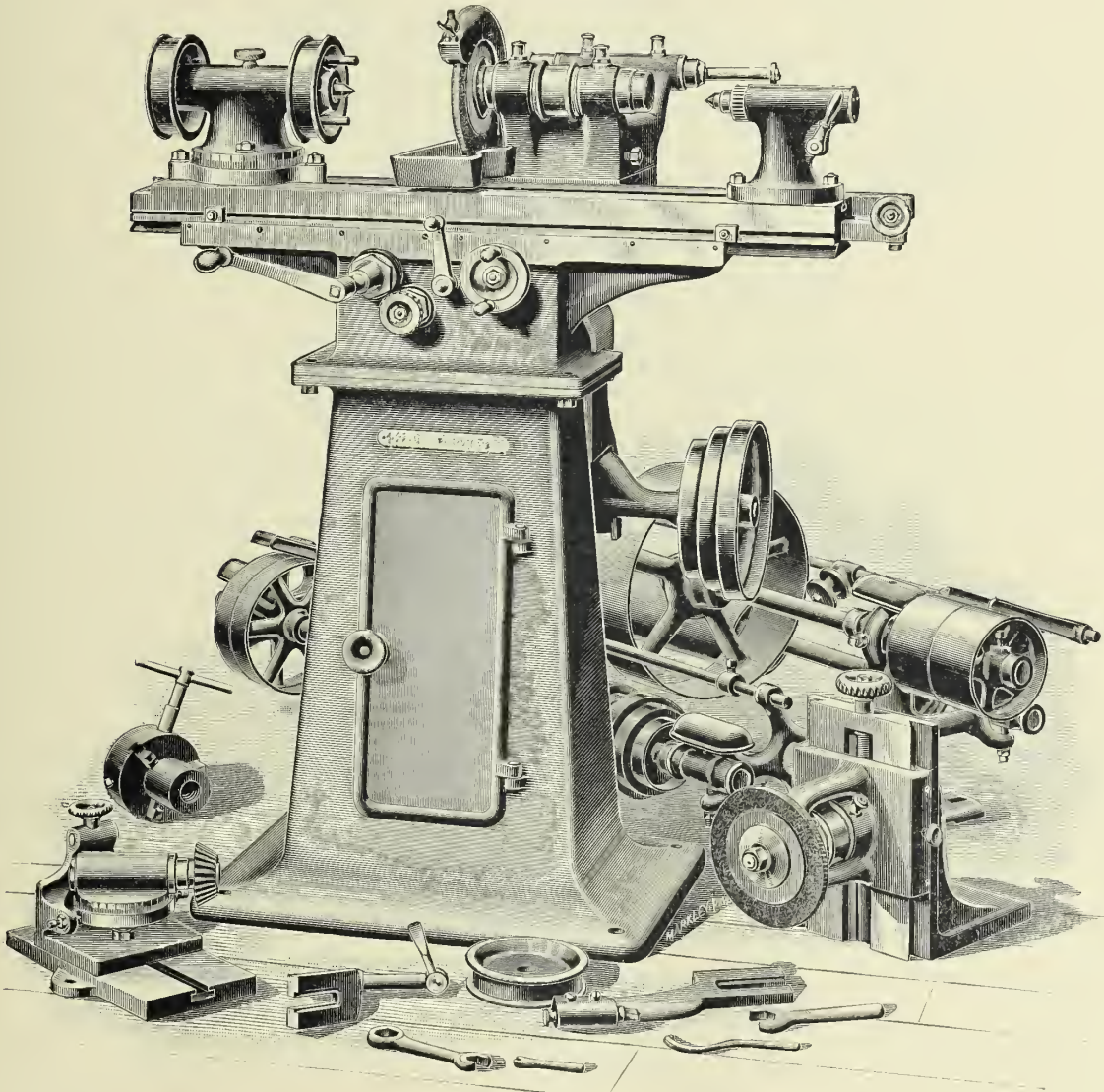
The countershaft has tight and loose pulleys 6 inches diameter, 3 inch face, and should run about 450 revolutions. Weight, with countershaft, about 1000 pounds.

Price of No. 1 machine complete, with countershafts, face-plate, center and back rests, emery wheel, three-jawed chuck, wrenches and dogs, aback - - - - - \$350.00

Price of pump and water connections, extra, add - - - - - 25.00

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FIG. 354.



UNIVERSAL GRINDING MACHINE No. C.

PATENTED.



DESCRIPTION UNIVERSAL GRINDER No. C.

MODERN requirements in machine construction—higher speed, greater accuracy, increased production, reduced cost—have advanced beyond the well-known limits of the lathe and the planer, which, compared with grinding machines, are now regarded as scarcely more than roughing tools; means for reducing to approximate size, but inadequate for finishing to that degree of accuracy and condition that are demanded in modern machinery. Marked attention has therefore been directed to grinding machines of the type known as Universal Grinders, machines of special design and construction, capable of a great variety of the higher forms of grinding.

We ask special notice of its distinctive features and general design; the latter having particular reference to means for maintaining its accuracy, and obtaining a minimum of vibration without the necessity for ponderous weight. In this connection it will be noticed that the work traverses the wheel, not the contrary, and that the table-slides are of the dovetail form, and the sliding-table does not depend merely upon its weight for its accuracy, consequently no vibration is imparted to it by the action of the belts. Attention is also asked to the small number of its working parts, all of which are accessible, of ample dimensions, constructed in the best manner and of the best materials. Its simplicity and the facility with which it can be quickly set to grind a great variety of pieces is especially noteworthy.

We illustrate the complete machine, and set for work between centers. The base is heavy and substantial and is arranged with a cabinet for small loose parts. The sliding-table is operated by rack and pinion and has three changes of speed by power which can be thrown out and the machine fed by hand, and has automatic reverse for any length piece between centers up to 20 inches; 10 inch swing. A swivel table rests on the sliding-table and turns on a central stud by hand-screw, and is locked by bolt and nut. It has a scale graduated to show the taper both in degrees and in inches to the foot. Exact settings can therefore be easily made. It has a T slot its entire length, into which the head-stock and foot-stock are carefully fitted. The head-stock swivels half way round and is graduated for taper chucked work. It has hollow taper spindle running in phosphor-bronze bearings and is arranged for grinding on live or dead centers, the latter being desirable when grinding shafts. The foot-stock has spring center to allow for expansion of pieces of small diameter, and is provided with a safe arrangement for locking the center when desirable. The wheel-head is very heavy, and is mounted on a stout dovetail slide on a large knee cast to the base. It swivels, and can be secured at any angle, and is turned end for end for internal grinding. The emery wheel is advanced to the work by hand-screw in front, which is also graduated, and is especially useful as the work approaches a fit.

The main emery wheel spindle is $10\frac{1}{4} \times 1\frac{1}{4}$ inches. Size regular emery wheel, $8 \times \frac{3}{8} \times 1$ inch hole.

Weight, about 1500 pounds.

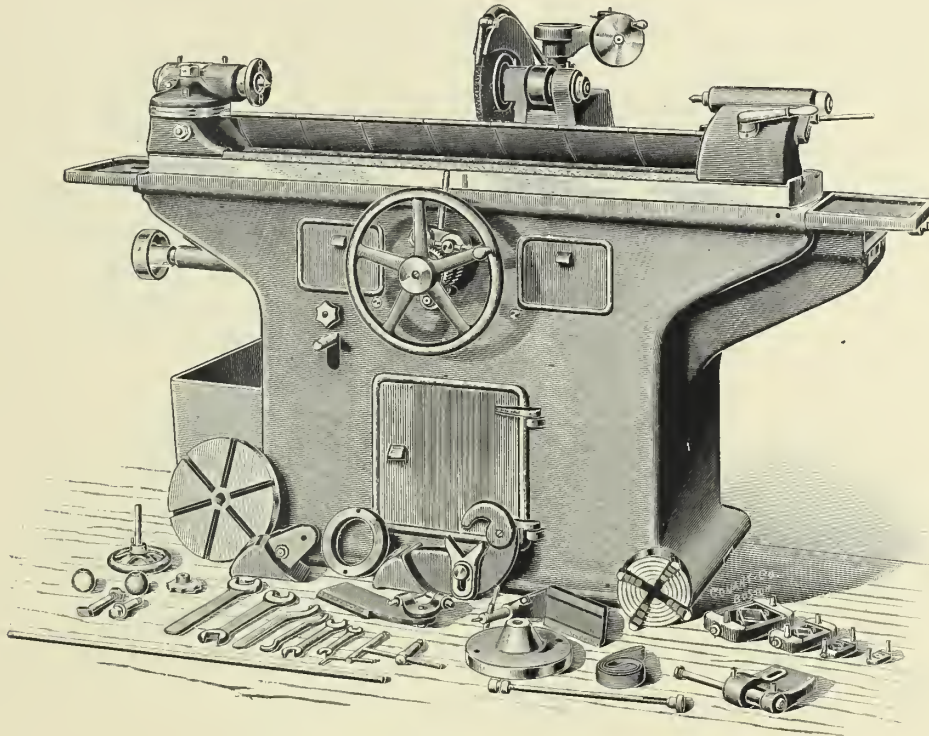
Price complete, without surface head and cutter holder,	-	-	-	-	-	-	-	-	\$575.00
Add for surfacing head,	-	-	-	-	-	-	-	-	75.00
Add for cutter holder,	-	-	-	-	-	-	-	-	50.00
Add for chuck and face plate,	-	-	-	-	-	-	-	-	20.00

Deduct \$ for no head for internal grinding if not wanted.

Deduct \$ for no automatic feed; that is, a plain or hand-fed machine which may be arranged for a special article of manufacture; also cutter grinding by simply adding the cutter-holder, thus greatly reducing the price.

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FIG. 355.



No. 3 UNIVERSAL GRINDING MACHINE.

THE MACHINES POSSESS THE FOLLOWING POINTS OF ADVANTAGE.

THOROUGHLY adapted for the free use of water in all grinding operations. All bearings thoroughly protected from dirt. All angles accurately ground. Head stock swiveled. All tapers can be ground upon the centers up to 4 inches per foot for No. 3, and 3 inches per foot for No. 4 machine, by the automatic traverse.

Swivel table clamped simultaneously at both ends.

Swivel table clamping device beneath the table, thoroughly protected from grit.

Swivel table adjusting screw beneath the table, excluded from the grit.

End of swivel table, a plain surface, easily kept clean; no slots to receive dirt.

Two graduations at the same end reading $\frac{1}{4}$ degree and $\frac{1}{8}$ inch taper per foot.

Foot-stock center held into the work by a spring of variable tension.

Traverse varied in an instant to any speed between $\frac{1}{16}$ inch and $1\frac{1}{4}$ inch to each revolution of the work.

Speed of work quickly varied to anything between 25 and 450 revolutions.

Emery wheel spindles of steel, hardened and ground and run in adjustable phosphor bronze bearings.

Emery wheel base is made very heavy to absorb all vibrations.

Quick change from external to internal grinding. No spindle and boxes to remove.

Emery wheels quickly changed, as they are on the end of the spindle.

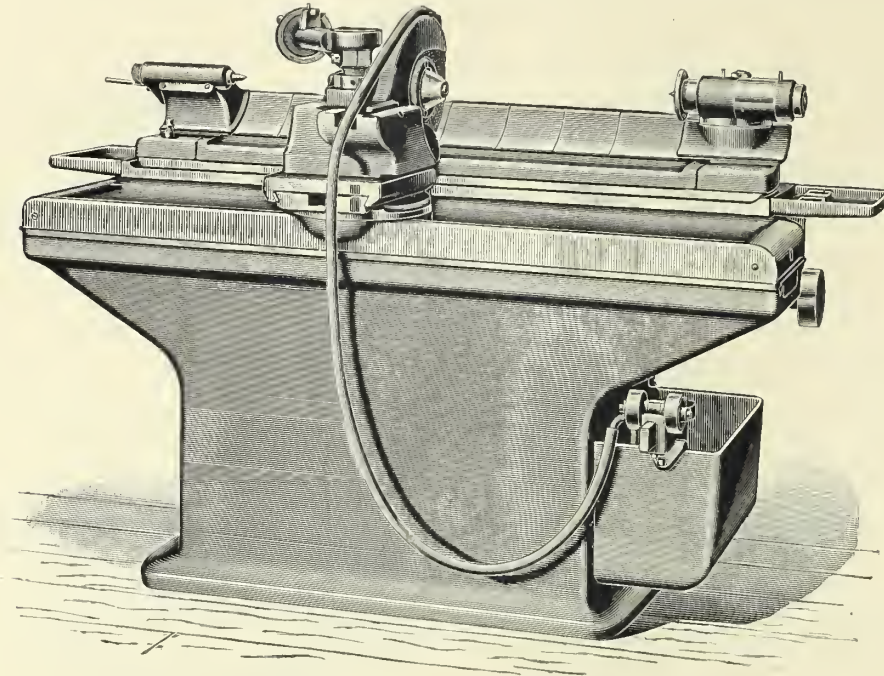
Emery wheel adjustment is graduated to indicate $\frac{1}{1000}$ inch diameter of work.

Head and foot-stock spindles are of steel, hardened and ground.

Emery wheel can go beyond the point of reversal and reverse as before, automatically, without readjusting.

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FIG. 356.



No. 3 UNIVERSAL GRINDING MACHINE.

REAR VIEW.

LATERAL adjustment of emery wheel by a graduated collar, to read to $\frac{1}{1000}$ to grind shoulders. Emery wheel carriage guide is the entire length of machine and is self-oiling. Carriage guide covered in all positions and protected from grit. Foot stock elamp by hand. No wrench used. Head and foot stocks are elamped against the edge of table, not dependent on a tongue fitting a groove. Accuracy of alignment of head and foot stock centers, as all the surfaces are seraped to surface plates. The internal grinding fixture has a bearing next to the emery wheel, allowing a small spindle for high speed. The emery wheel cannot accidentally be thrust into and damage the work, as the hand wheel is located above and prevents this. The water pan is never removed for any operation. Full swing of the machine for all operations, with the water pan for the free use of water the entire length. All kinds of grinding is done over the water pan, and the finished parts are protected by telescopic water guards. The traverse worm is self-oiling. Reversing points adjustments are fine, and continuous in either direction without returning. No step cone pulleys are used, no pole needed to ship belts to change speed. Overhead works are self-contained for No. 3 and 4 machines, easy to put up. Self-oiling loose pulley and hanger boxes.

WORKMANSHIP AND MATERIAL.

In the manufacture of these machines we aim to use the best material. All parts on which there is much wear, such as emery wheel spindles, are hardened and ground, and all screws requiring frequent use are case-hardened. The bearings are made of phosphor bronze for emery wheel and head stock spindles, and other bearings are made of good anti-friction metal.

The workmanship is of the best. All plane surfaces are seraped to surface plates. All shafts throughout the machines are ground. In every respect the utmost pains are taken to insure good work. All wearing parts are protected from grit, and every provision is made to carry away the water in a proper course when it is freely used.



No. 3 UNIVERSAL GRINDING MACHINE.

THE capacity of this machine is 12-inch swing and 42 inches between centers, while the distance between centers may be extended 2 inches more. Weight of machine is about 3800 pounds. With this machine is furnished an internal grinding fixture, pulley and belt to drive the same, four-jawed chuck, face plate, chuck for thin cutters, center rest, stationary back rest, sliding back rest, cutter tooth rest, large and small dead center pulleys for driving the work, centers, complete set of wrenches, four double tail equalizing dogs, pump, water tank, hose, overhead cord weights and rod knob, two water-guard rods, complete set of water guards, hand wheel for operating head-stock spindle, complete overhead works.

A 3-inch belt is used to drive from the line shaft, a $1\frac{1}{2}$ -inch drives the emery wheel, a $1\frac{1}{4}$ -inch drives the work, a $1\frac{1}{2}$ -inch drives the feed and a 1-inch drives the pump. Tight and loose pulleys are 8 inches diameter, $3\frac{1}{4}$ inches wide, and run 525 revolutions.

No. 4 UNIVERSAL GRINDING MACHINE.

THIS machine is identical in all its parts with that of the No. 3, the only difference being that it takes 2 feet more between centers, being in capacity 66 inches between centers and 12-inch swing, table can be swung to $2\frac{1}{2}$ inches per foot taper and $5\frac{1}{2}$ degrees.

Weight of this machine is about 4400 pounds.

Speeds of overhead works and belting used are exactly the same as for the No. 3 machine.

The attachments and accessories furnished with this machine are exactly the same as those furnished with the No. 3 machine.

No. 5 UNIVERSAL GRINDING MACHINE.

THE machine has a capacity of 20-inch swing and takes 96 inches between centers, and will grind to 4 inches per foot for whole taper and 9 degrees from each side of the center line of shaft. The weight of the machine is about 10000 pounds, and 11000 pounds when boxed for export.

With this machine is furnished a blue print drawing showing plan for erecting the machine, an internal grinding fixture, pulley and belt to drive the same, a four-jawed chuck, center rest, stationary back rest, sliding back rest, centers, complete set of wrenches, pump, water tank, hose, overhead works rod knob, weights for cords, two water-guard rods, complete set of water guards, complete overhead works.

The tight and loose pulleys are 10 inches diameter, 4 inch face, and should run 525 revolutions.

INTERNAL FIXTURE SIZES.

No. 2 fixture grinds holes from $\frac{1}{2}$ to $\frac{3}{4}$ inch. Speed, 15700 revolutions.

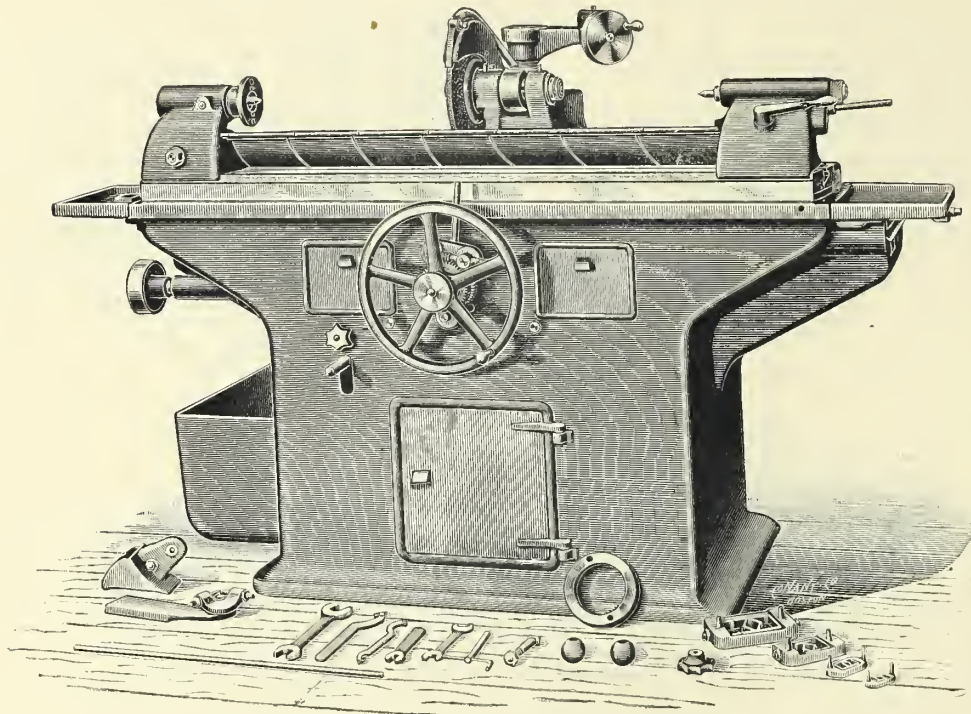
No. 3 fixture grinds holes from $\frac{3}{4}$ inch upward. Speed, 13000 revolutions.

No. 4 fixture grinds holes from 1 inch upward. Speed, 10000 revolutions.

No. 5 fixture grinds holes from 2 inches upward. Speed, 8000 revolutions.

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FIG 357.



Nos. 3 AND 4 PLAIN GRINDING MACHINES.

THIS illustration represents our No. 3 Plain Grinding Machine, and with the difference of two feet longer also gives a correct idea of the No. 4 machine. These machines are built identically the same as the No. 3 Universal machine, with the following exceptions only: The head stock is not made to swivel, and its arrangement will be seen in the cut. The machine will grind taper as well as straight shafts, and for grinding the centers the emery wheel slide is swung to proper angle and the hand wheel for emery wheel feed up is used.

The machine can at any time be converted into a Universal by procuring head and foot stock and the attachments. For manufacturing advantages we build these machines so nearly alike, and there is nothing in this Plain machine which is not of good service to it.

The capacity of these machines is the same as the Universal.

No. 3 machine weighs about 3800 pounds; No. 4 machine, about 4400 pounds.

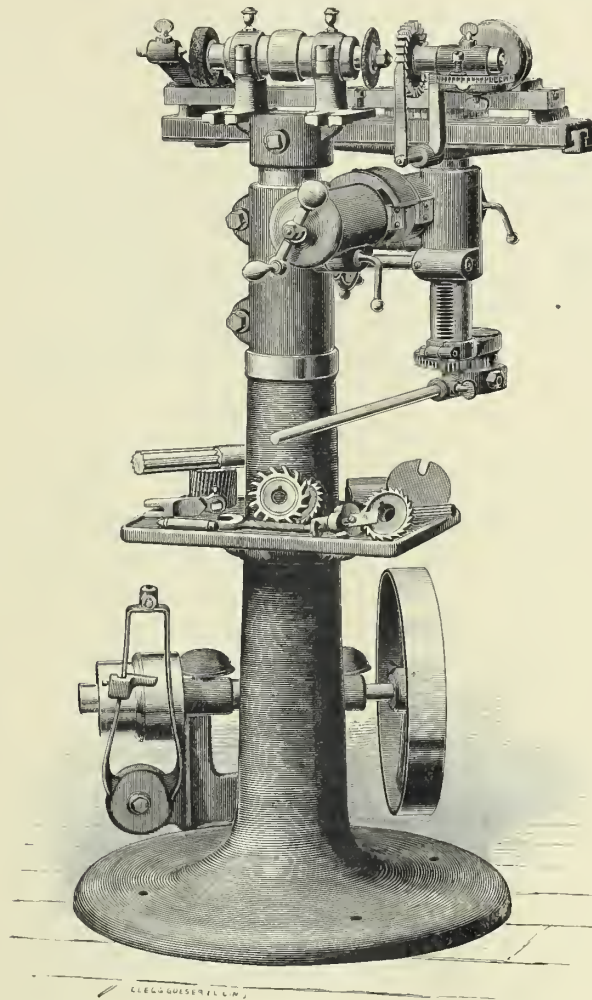
With these machines we furnish the plan for erecting the same, a stationary back rest, sliding back rest, large and small dead center pulleys for driving the work, centers, complete set of wrenches, four double tail equalizing dogs, two guard rods, complete set of guards, knob for rod to overhead works, weights for cords, pump, hose, water tank, complete overhead works.

No. 5 PLAIN GRINDING MACHINE.

This machine is identical with the Universal, with the exception that the head stock is not swiveled. The capacity, weights and attachments are the same, with the exception that the internal grinding fixture, center rest, pulley and belt and the chuck are omitted,

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FIG. 358.



UNIVERSAL CUTTER AND TOOL GRINDER.

GENERAL DESCRIPTION.

THIS MACHINE is provided with all adjustment necessary to grind between centers work to 8 inches in diameter, but straight face cutters, metal slitting saws, inserted tooth mills, etc., can be ground to 14 inches in diameter. It is also arranged for grinding cylindrical, conical and flat surfaces, such as hardened spindles, arbors, bushings, cam rollers, concave sides of cutters and saws, and the face of punching dies, hardened gauges and templates. A great variety of small machine parts can also be finished to an advantage by grinding on this machine.

It is perfectly universal and differs from other machines in the fact that it will grind any cutter and reamer without the use of special attachments, and that all work is done on a horizontal slide.



General Description Universal Cutter and Tool Grinder.—Continued.

Those familiar with grinding taper reamers, and the side teeth of side milling and angular cutters, are aware that the adjustment of the tooth-rest is a difficult one, because the cutting edge of tooth to be ground must be exactly parallel with the line of slide. This difficulty is overcome in this machine. No attention is required to adjust the tooth-rest, as it is centrally fixed for all diameters of cutters and reamers. In grinding work the tooth-rest travels with the cutter, except when grinding spiral mills. It is made spring like, acting as a pawl in a ratchet. This is a very positive and rapid way of passing to next tooth.

The side teeth of angular and side milling cutters are ground off with a practically straight line clearance. This is done with a cup-shaped emery wheel, 3 inches in diameter, on the left side of the machine. The advantage of grinding side teeth with a fair-sized emery wheel, and at the same time grinding a straight line clearance with a corresponding strong cutting edge, is known to those who have heretofore been compelled to use a small wheel making a hollow clearance with a corresponding weak cutting edge.

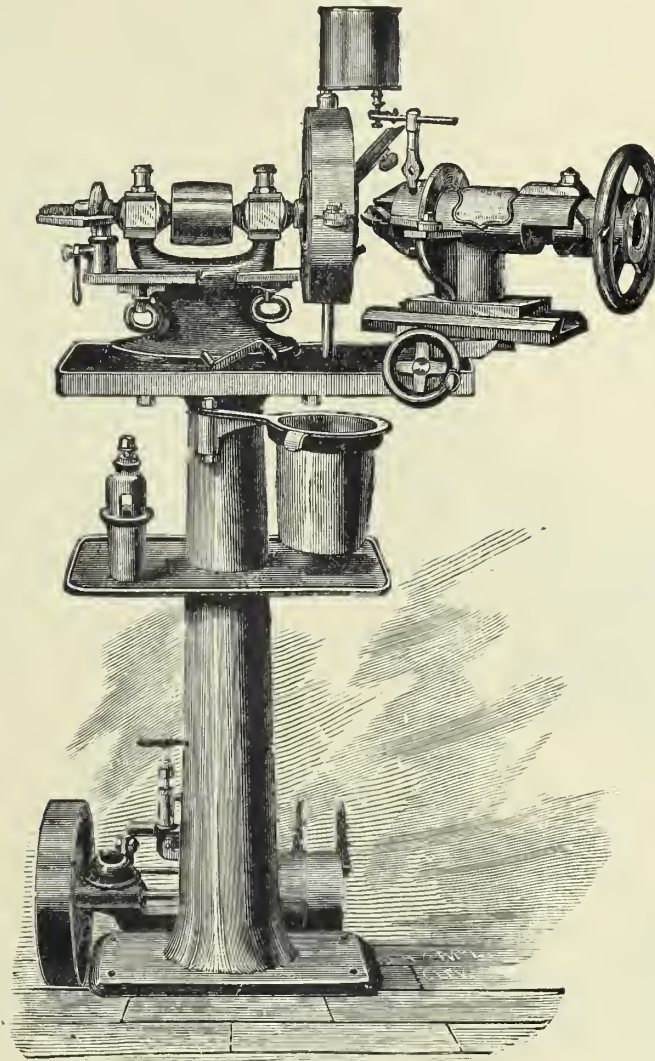
An important feature of this machine is this: that the table may be swung around on the column, and that the work can be brought into contact with the emery wheels on either side of the machine. Some of the advantages of this feature are as follows: Work may be brought into contact with wheels in the most favorable manner for rapid grinding without heating the cutter. Work may be ground more rapidly; for instance, a side milling cutter may have the top teeth ground off on the straight emery wheel on the right side of the machine, and the side teeth on the cup-shaped wheel at the left side of the machine, without taking the cutter off the arbor or disturbing the tooth-guide. Cutters of small diameter and sharp angles can be brought into contact with the emery wheel without the cutter, mandrel or centers striking the belt or head-stock of the machine. In cylindrical grinding this feature permits the wheel to grind close up to a shoulder. In grinding the side teeth of side milling and angular cutters, a slight movement of the table around the column changes the character of the cut from a sharp clearance for the stocking out between the teeth to a slighter clearance for finishing the cutting edge without any danger of drawing the temper. This same feature permits the rapid adjustment of the machine from a simple cutter grinder to a surface grinder.

The table is moved forward and back by means of a lever, which can be placed to suit the position or convenience of the operator. For the rapid adjustment of table towards the emery wheel, the holder carrying it slides on a shaft, while for the fine adjustment of grinding a screw is used. The table is elevated or lowered by means of a rack and pinion, and has a vertical adjustment of $3\frac{3}{4}$ inches. It is $20\frac{3}{4}$ inches long, has a horizontal movement of 12 inches, and will take in work between centers 15 inches long. Adjustable dogs for stops on each end are provided. The table makes a complete revolution on slide, and may be set at any angle to 90 degrees. Any one having used machines with a limited range as to swiveling table will appreciate this improvement. As long as the table is parallel to the line of motion of slide, work ground will be straight without regard to its position as to emery wheel spindle. The work-holder or swiveling-head swivels both vertically and horizontally for clearance, and for grinding work at an angle. All adjustments of table and swiveling-head are indicated in degrees. The spindle is hardened and ground and runs in bronze bearings. It is provided with dust-caps and adjustment for wear. It has but one speed. All the wheels furnished with the machine have been selected for the various work illustrated, and operate best at the speed given. Endless belts may be used, as the spindle-head may be moved up or down for adjusting them. A hand rest is furnished for turning off the emery wheels and grinding other work by hand. The countershaft furnished with this machine for driving the emery wheel spindle is complete, including a novel device for shifting the belt. The loose pulley is made smaller in diameter than the tight pulley to relieve the belt when the machine is not being used.

Write for pamphlet containing outline engravings showing the application of this machine to the various kinds of work.

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FIG. 359.



PATENT TWIST DRILL GRINDING MACHINE.

THIS machine is adapted for grinding to a proper angle and with a suitable clearance the cutting lips of twist drills. Please note the following facts, viz: This machine holds in the same chuck drills from $\frac{1}{8}$ to $1\frac{1}{8}$ inch, and grinds both sides without removing drill from the chuck, thereby reducing the time of grinding to less than one-half that of any other machine in the market.

It grinds both sides exactly alike, and leaves the point a perfect center. More or less clearance can be given, as desired. Nothing is left to the judgment of the workman.

All wearing parts are made of hardened steel, carefully tempered. All parts of these machines are made interchangeable so that any part of any machine can be duplicated with certainty of fit.

The emery wheels are made specially, and run with water to prevent drawing of temper. Size of wheel, 9 inches diameter and $1\frac{1}{2}$ inch face. The grinding is done on side of wheel, which can be properly dressed by using the tool-holder and diamond in place of grinding attachment in taper socket on upper slide and running same across the wheel by means of small hand wheel and feed screw. A wheel can be run on left end of spindle for ordinary tool grinding. Speed of emery wheel, 1600 revolutions per minute.

Price complete, with column and countershaft, - - - \$100.00

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FIG. 360.

CUTTER GRINDING MACHINE.

WE desire to call special attention to this simple machine for grinding milling cutters, taps, taper reamers, lathe tools, etc., etc. Cutters to 6 inches in diameter, both spiral or straight, reamers 14 inches and less in length, can be ground on this machine. The bearings are adjustable for wear, and the ways are gibbed, so that the machine can always be kept in good working order. The arbor is arranged for two wheels, one on each end. The base has a number of shelves, making a convenient place to keep tools. The machine is of thorough workmanship, and substantial in all its parts.

SPECIFICATIONS.

Weight of machine, complete, 200 pounds.
Speed of countershaft, 500 revolutions per minute.
Tight and loose pulleys on countershaft, 2 inch face, 4 inches diameter.

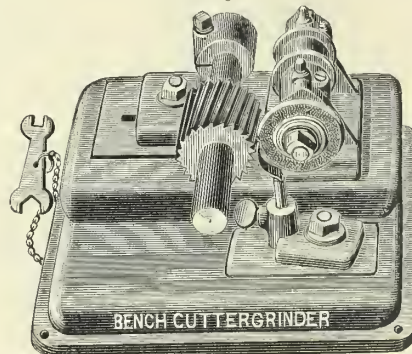
We furnish this machine either with or without base. Emery wheels are not included. Over-head work accompanies each machine.

BENCH CUTTER GRINDER.

THIS small machine has ample capacity for all the ordinary sizes and varieties of milling cutters, while its compactness and small cost render it practicable to have several distributed around the shop in the vicinity of each group of milling machines, where they will prove a valuable addition to the plant, and soon pay for themselves in time saved. The machine is well made throughout, and will grind straight or spiral mills and shell reamers from 5 inches diameter and 4 inch face down to the smallest; side or face mills, bevel or angle cutters, from 8 inches diameter down; hand machine, rose and taper reamers, as large as 1½ inches diameter, and 8 inches long; butt mills, either straight or taper; cutters for milling T-slots and hollow mills, such as used on screw machines. Saws, cutters for gear teeth, drills, and all such tools as are generally ground by hand, can also be handled. Both spindle and arbor are of steel, hardened and ground, the latter to 1 inch standard size. All adjusting screws and nuts are case-hardened, and fit wrench attached to the machine. The machine can be placed on the bench where most convenient, and driven by straight or quarter turned belt. A single hanger countershaft, with 3 x 1½ inch tight and loose pulleys, completes the machine.

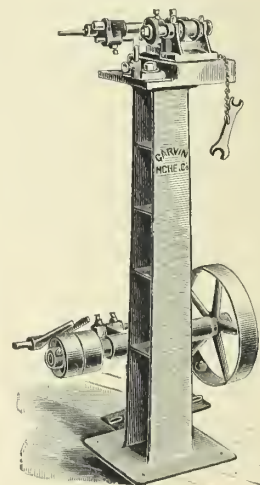
Speed of countershaft, 650 revolutions.
Price complete with emery wheel and countershaft, \$
Price on column with emery wheel and countershaft, \$

FIG. 361.



Shows Grinder Arranged for Bench.

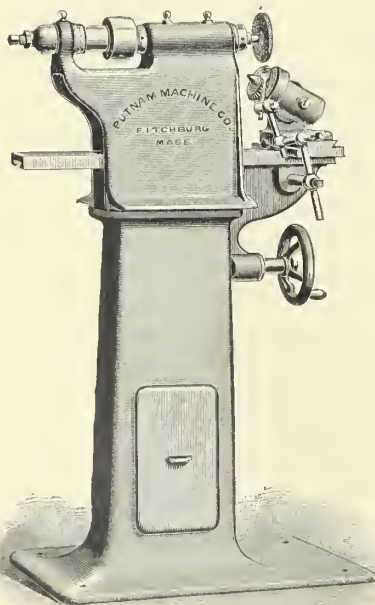
FIG. 362.



Shows Grinder Mounted on Column.

Cutter Grinding Machine.

FIG. 363.



Universal Mill and Cutter Grinder.

UNIVERSAL MILL AND CUTTER GRINDER.

DESCRIPTION.

THIS MACHINE is designed for grinding milling cutters, reamers, etc. Is convenient, well designed and smooth running, of sufficient weight to absorb the vibration incident to a high spindle velocity.

Is driven by cone with two changes of speed. Arbor is of steel, bearings are protected from dust, and have Babbitt lined boxes. Front journal is 10 inches long.

Will grind cutters (any length) up to 7 inches diameter, milled straight or spiral, bevel cutters any angle, hollow mills, straight or taper shell and shank reamers milled straight or spiral, with holes or shanks straight or taper.

Furnished with countershaft, wrenches, etc.

Countershaft has tight and loose pulleys 4 inches diameter, for 2½-inch belt, and should make 450 revolutions per minute. Weight, 600 pounds. Price, \$

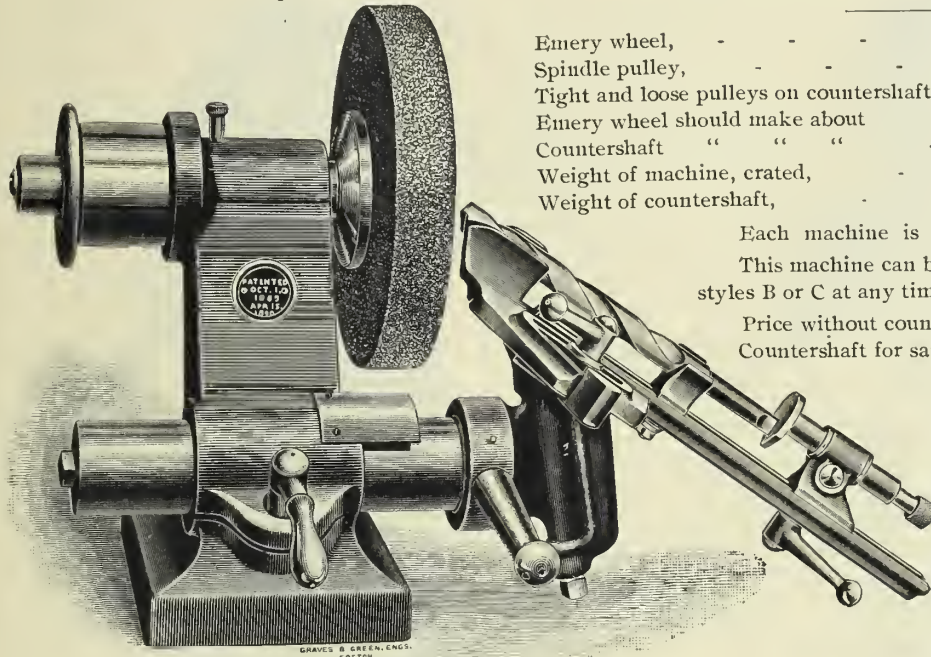
An extra attachment is fitted to this machine for the purpose of sharpening side or straight-faced lathe or planer tools required for wide surfacing cuts. Tools ground on this fixture are perfectly straight across their cutting faces,—a feature which is impossible to attain by hand on either the ordinary grindstone or emery wheel.

We also furnish a special attachment for grinding muckel steel (or hardened tool steel) cutters.

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FIG. 365.

THE WORCESTER DRILL GRINDER, No. 1. (STYLE A).



Emery wheel,	- - - - -	9 ins. diam., 1½ ins. thick
Spindle pulley,	- - - - -	3 ins. diam., 1⅞ in. face
Tight and loose pulleys on countershaft,	- - - - -	4¾ ins. diam., 2⅜ in. face
Emery wheel should make about	- - - - -	1200 revolutions
Countershaft " " "	- - - - -	250 revolutions
Weight of machine, crated,	- - - - -	100 pounds
Weight of countershaft,	- - - - -	50 pounds

Each machine is fitted with emery wheel, as shown in cut.

This machine can be mounted on either of the pedestals used in styles B or C at any time.

Price without countershaft,	- - - - -	\$55.00
Countershaft for same,	- - - - -	10.00

Grinds drills, from ¼ inch to 2 inches.

Full directions sent with each machine.

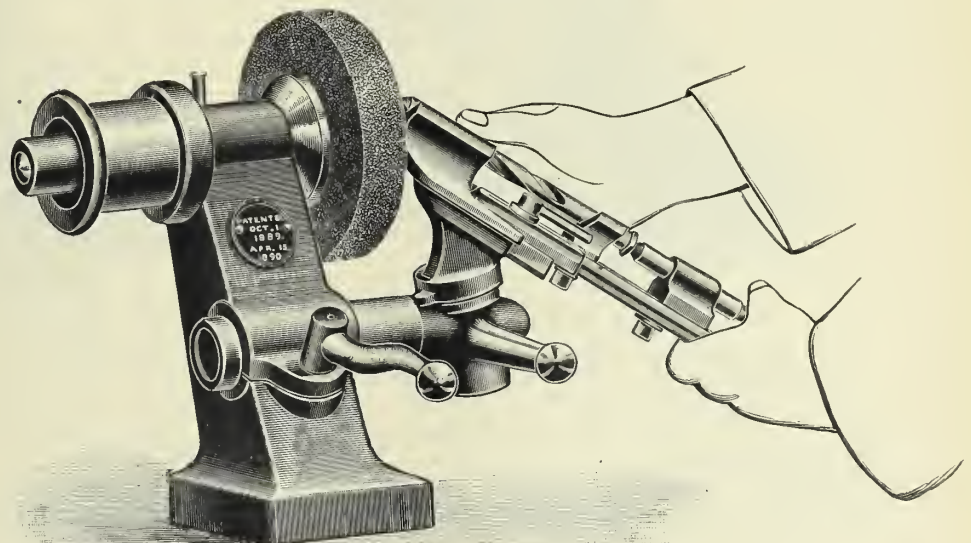
EXTRAS.

Diamond truer,	- - - - -	\$5.00
Point thinning attachment (including emery wheel),	- - - - -	3.00
Attachment for 3-lip drills,	- - - - -	3.00
No. 1 emery wheels,	- - - - -	4.00
Style B pedestal,	- - - - -	5.00
Style C pedestal,	- - - - -	20.00

THE WORCESTER DRILL GRINDER, No. 2. (STYLE A).

FIG. 366.

Grinds drills from ¼ inch to 2 inches.
 Emery wheel, 6 ins. diam., 1¼ ins. thick.
 Spindle Pulley, 2½ ins. diam., 1⅞ in. face.
 Tight and loose pulleys on countershaft,
 4¾ ins. diam., 2⅜ in. face.
 Emery wheel should make about 1700 revolutions.
 Countershaft should make about 300 revolutions.
 Weight of machine, crated, 75 pounds.
 Weight of countershaft, 50 pounds.
 Each machine is fitted with emery wheel, as shown in cut.
 This machine can be mounted on either of the pedestals used in styles B and C at any time.
 Price without countershaft, - \$45.00
 Countershaft for same, - - 10.00
 Full directions sent with each machine.



EXTRAS.

Diamond truer,	- - - - -	\$5.00	Style B pedestal,	- - - - -	\$5.00
No. 2 emery wheels,	- - - - -	2.50	Style C pedestal,	- - - - -	20.00

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FIG. 367.



THE WORCESTER DRILL GRINDER, No. 1.
STYLE B.

Grinds drills from $\frac{1}{4}$ inch to 2 inches.

Emery wheel, - - - - -	9 ins. diam., $1\frac{1}{2}$ ins. thick
Spindle pulley, - - - - -	3 " " $1\frac{1}{2}$ " face
Tight and loose pulleys on countershaft, - - - - -	$4\frac{3}{4}$ " " $2\frac{3}{4}$ " face
Emery wheel should make about - - - - -	1200 revolutions
Countershaft " " - - - - -	250 revolutions
Weight of machine, crated, - - - - -	175 pounds
Weight of countershaft, - - - - -	50 pounds

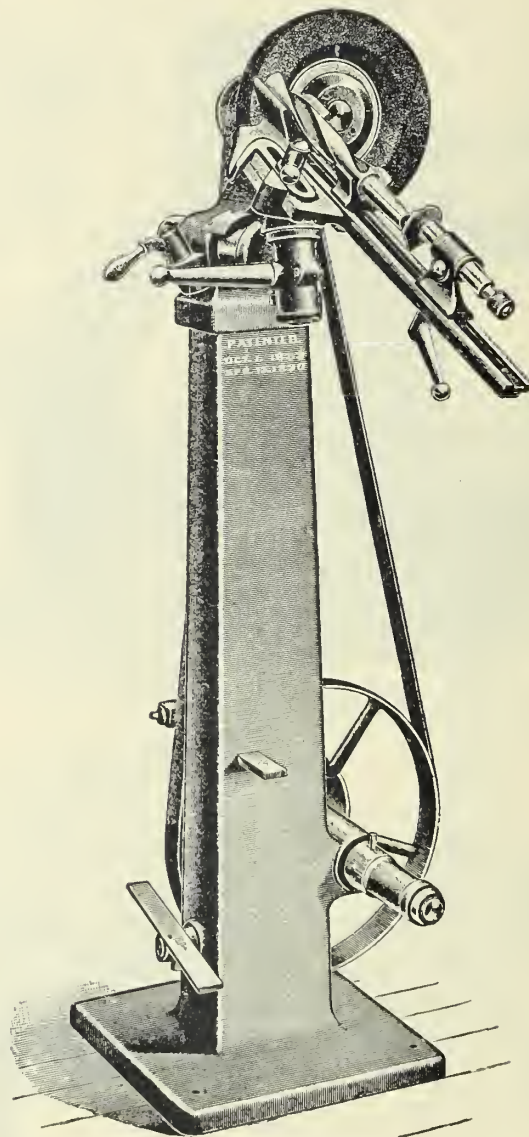
Each machine is fitted with emery wheel, as shown in cut.

EXTRAS.

Diamond truer, - - - - -	\$5.00
Point thinning attachment (including emery wheel), - - - - -	3.00
Attachment for 3-lip drills, - - - - -	3.00
No. 1 emery wheels, - - - - -	4.00
Price without countershaft, - - - - -	60.00
Countershaft for same, - - - - -	10.00

Full directions sent with each machine.

FIG. 368.



THE WORCESTER DRILL GRINDER, No. 1.
STYLE C.

Grinds drills from $\frac{1}{4}$ inch to 2 inches.

Emery wheel, - - - - -	9 ins. diam., $1\frac{1}{2}$ ins. thick
Spindle pulley, - - - - -	3 " " $1\frac{1}{2}$ " face
Tight and loose pulleys on countershaft, - - - - -	7 " " $2\frac{3}{4}$ " face
Emery wheel should make about - - - - -	1200 revolutions
Countershaft " " - - - - -	250 revolutions
Weight of machine, crated, - - - - -	200 pounds

Each machine is fitted with emery wheel, as shown in cut.

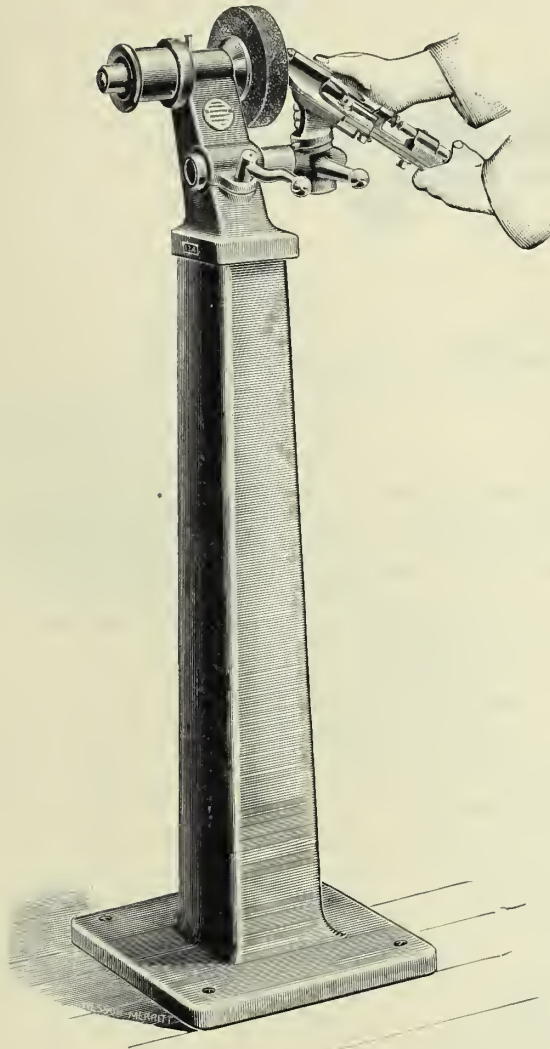
EXTRAS.

Diamond truer, - - - - -	\$5.00
Point thinning attachment (including emery wheel), - - - - -	3.00
Attachment for 3-lip drills, - - - - -	3.00
No. 1 emery wheels, - - - - -	4.00

Price complete, \$75.00.

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FIG. 369.



THE WORCESTER DRILL GRINDER, No. 2.
(STYLE B.)

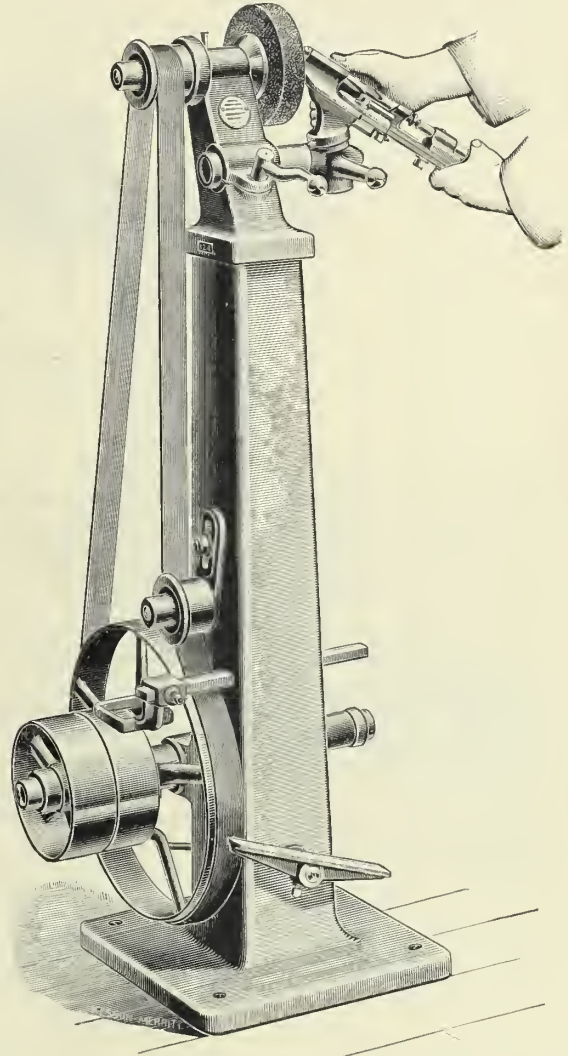
Grinds drills from $\frac{1}{8}$ inch to $\frac{7}{8}$ inch.

Emery wheel, - - -	6 ins. diam., $1\frac{1}{4}$ ins. thick
Spindle pulley, - - -	$2\frac{1}{2}$ ins. diam., $1\frac{1}{8}$ in. face
Tight and loose pulleys on countershaft,	$4\frac{3}{4}$ ins. diam., $2\frac{3}{8}$ in. face
Emery wheel should make about -	1700 revolutions
Countershaft " " -	300 revolutions
Weight of machine, crated, - - -	150 pounds
Weight of countershaft, - - -	50 pounds
Each machine fitted with emery wheel, as shown in cut.	
Price without countershaft, - - -	\$50.00
Countershaft for same, - - -	10.00

EXTRAS.

Diamond truer, -	\$5.00	No. 2 emery wheel, -	\$2.50
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FIG. 370.



THE WORCESTER DRILL GRINDER, No. 2.
(STYLE C.)

Grinds drills from $\frac{1}{8}$ inch to $\frac{7}{8}$ inch.

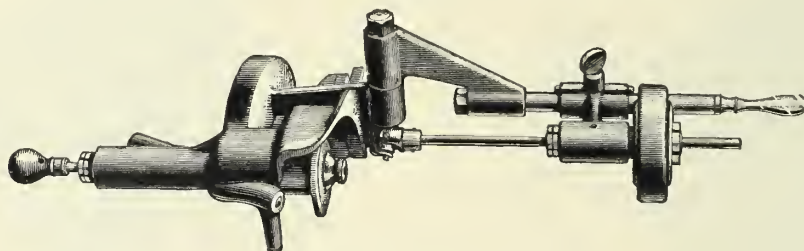
Emery wheel, - - -	6 ins. diam., $1\frac{1}{4}$ in. thick
Spindle pulley, - - -	$2\frac{1}{2}$ ins. diam., $1\frac{1}{8}$ in. face
Tight and loose pulleys on countershaft,	7 ins. diam., $2\frac{3}{8}$ inch face
Emery wheel should make about -	1700 revolutions
Countershaft " " -	300 revolutions
Weight of machine, crated, - - -	175 pounds
Each machine fitted with emery wheel, as shown in cut.	
Price complete, - - -	\$65.00

EXTRAS.

Diamond truer, -	\$5.00	No. 2 emery wheel, -	\$2.50
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FIG. 371.



PAT. MAY 9, 1893.

CENTER GRINDING MACHINE.

DESCRIPTION.

THE engraving on this page represents a machine for grinding centers in place—one that can be quickly placed in the lathe with scarcely more care or attention than is required in setting an ordinary lathe tool. The simple act of placing the machine upon centers, and clamping in tool post, gives both the angle and position of wheel axis, in same plane as that of the lathe spindle. The lathe requires no change to use the grinder, even the dog plate remaining in place. It is designed for centers of 60 degrees angle.

This Lathe Center Grinding Machine is furnished complete with one wheel upon spindle ready for use and one extra wheel, also one Brown & Sharpe center gauge and one center reamer, all nicely boxed.

Price, \$40.00 net.

This Center Grinder is the only one that will grind centers perfectly true to the desired angle at the first adjustment. It is simple, effective, convenient, and can be depended upon for perfect work. It is quickly adjusted by a turn of the wrist and is then ready to start, requiring no change in the lathe to use it. It is all in one machine and there are no extras. It is adjustable to large or small lathes, and grinds centers equally well on either. It is accurately constructed and is durable, the parts being covered for protection, adjustable to wear, easily replaced, and not likely to get out of order. The proper speed of emery wheel can be maintained, it being driven directly from the cone of the lathe, and has no belts or hand cranks.

FIG. 372.

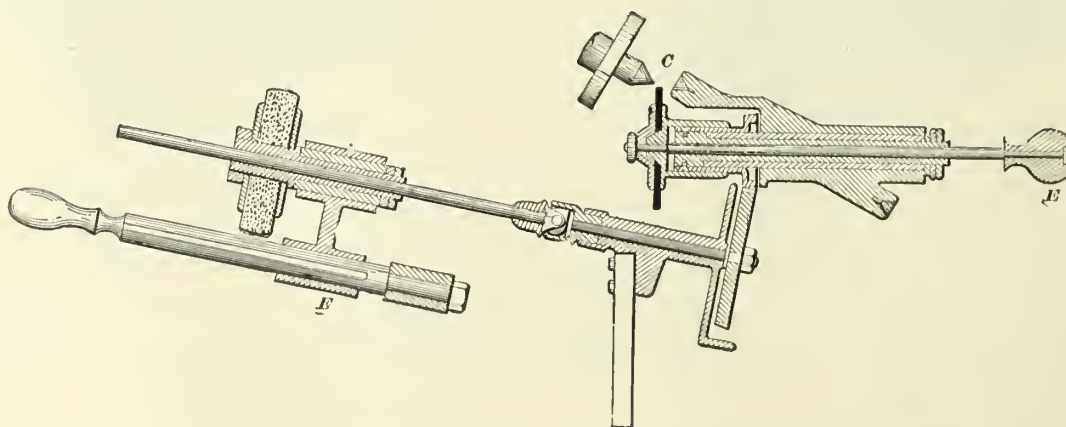


FIG. 372 is a section showing the general construction of the machine and its relative position to the center when ready to grind.

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FIG. 373.

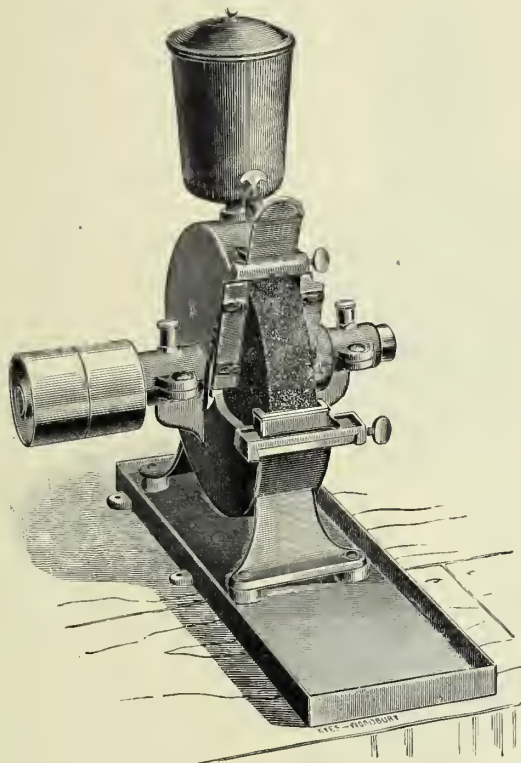
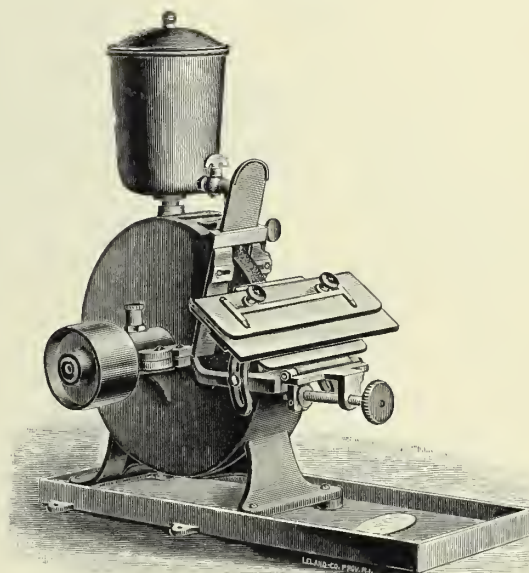


FIG. 374.



THE BENCH TOOL GRINDER.

THE Bench Tool Grinder is designed to sharpen machinists' tools of all kinds, running a corundum wheel in water, the grade of wheel varying to suit the kind of work to be done. The particles of corundum composing the wheel are hard and sharp, and will cut many times faster than the ordinary grindstone. It takes up less room; it is cleaner; it makes no offensive smell, and is the cheapest general tool grinder ever produced. This machine can be set up anywhere, taking up bench room of only 22 x 12 inches, thus allowing several to be located on a floor in large shops, having them conveniently situated for the men, so as to avoid walking long distances to sharpen a tool. The saving of time in this way alone will soon pay for the small cost of the grinder. We have adopted for use in this grinder a special corundum wheel, which, by reason of its porous nature, is constantly moist, and in consequence all danger of drawing the temper from tools is avoided.

Set the grinder on bench or stand, slightly pitched to the front, the near edge of pan projecting over the bench. The water runs to the front (where a hole is drilled), and into a bucket or pail, which can be swung from a hook provided underneath the pan. A waste pipe can be attached to run the water off, if desired.

Speed of wheel, 700 to 900 revolutions per minute.

Price, with 10 x 1 inch wheel, single or double pulleys,	- - - - -	\$25.00
Price, with 10 x 2 inch wheel, single or double pulleys,	- - - - -	30.00
Countershaft, extra,	- - - - -	12.00
Price of adjustable angle rest, shown above,	- - - - -	3.50
Price of adjustable angle rest, with traverse table,	- - - - -	15.00

SHOWING BEVEL GRINDING ATTACHMENT, WITH TRAVERSE TABLE AND MOVEMENT ACROSS THE EMERY WHEEL.

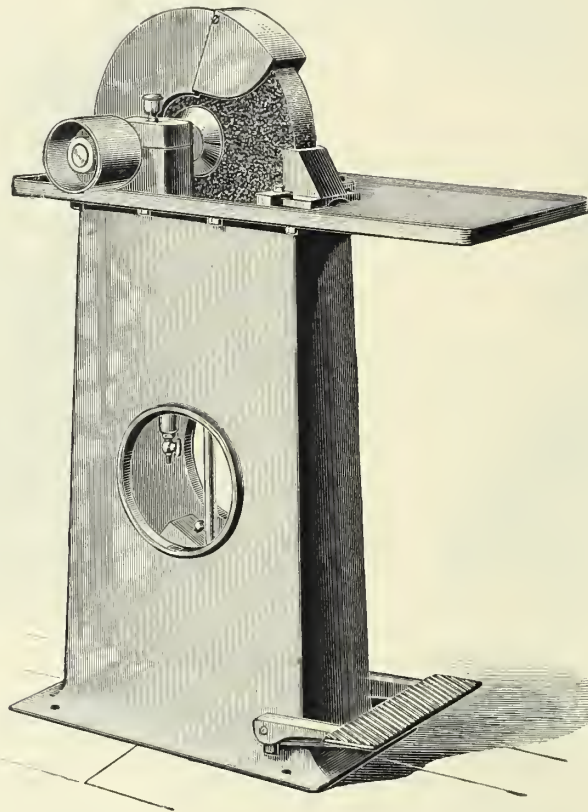
All that is designed to illustrate here, as shown in Fig. 374, is an attachment or fixture that enables the operator to grind straight and true any length up to 12 inches (or more if required) by hand movements.

The work is moved to the wheel by a screw shown in front of the machine; any angle can be obtained that is desired; the traverse across the face of the emery wheel is by hand movements, the upper table upon which the work is held having two V slides with corresponding grooves to receive the same.

Price of adjustable angle rest, with traverse table,	- - - - -	\$15.00
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FIG. 375.



IMPROVED WATER TOOL GRINDER.

THE above illustration represents the improved Water Tool Grinder for general shop use. This machine runs an emery or corundum wheel 14 inches in diameter by two inches thick. It has no pumps to get out of order; does its work perfectly, and is easily cleaned.

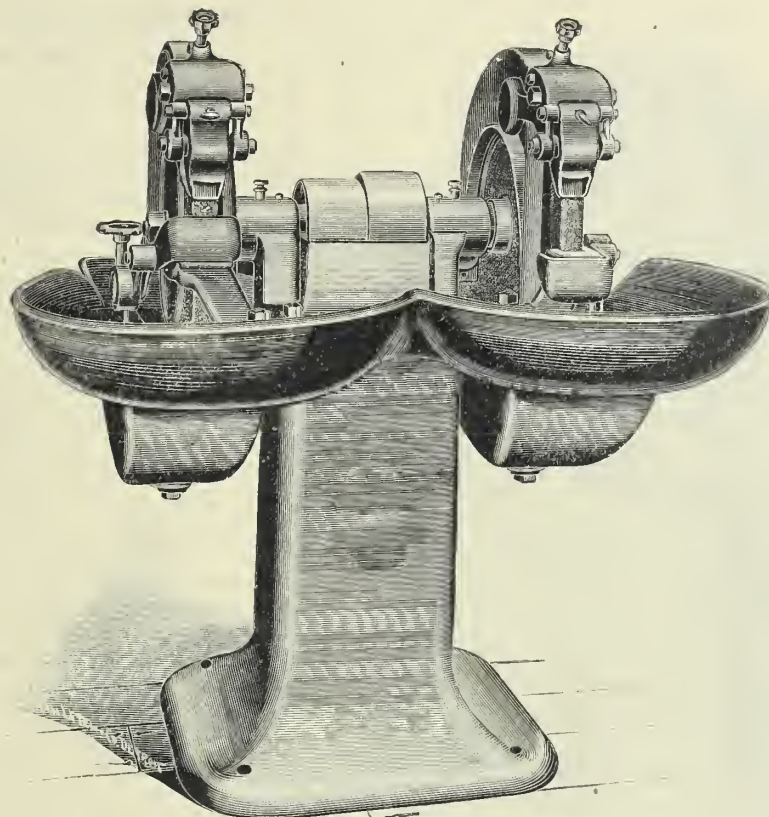
An abundance of water is carried up from the tank on the inside of the column by the wheel, when foot is placed on the treadle.

This machine will grind four times as fast as a grindstone; does all the work of machines heretofore in the market which are sold for higher prices, and every machine is guaranteed.

Size of apron, 14 x 30; size of wheel, 14 inches diameter, 2 inches thick.

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FIG. 376.



TOOL GRINDER

FOR THE MACHINE SHOP.

Description.—The front of the water pan is in the form of two half-round bowls, the cutting faces of the wheels being in the center of each bowl; the operator may always stand at the same distance from the wheels, in whatever position he wishes to hold the tool; this is a new feature in both double and single tool grinders. The rests are provided with guards, which prevent the spray from rusting work and tools near the machine. These guards are simple, positive, and not liable to get out of order.

Water Supply.—The water supply may be perfectly regulated by the operator. Any desired amount, from a slightly moist stone to a flood, may be obtained without wetting either the operator or the floor, by turning a hand wheel, and after the water is adjusted the supply is constant, as there are no pipes, cocks or pumps to clog the flow. The wheels are thus constantly saturated with water. A little reflection will convince one that this is a very desirable result as compared with the intermittent wet and dry wheel, which is a feature of all other machines.

Device for Keeping Wheels True.—The wheels are kept true and in the most perfect condition for their work, without the use of a diamond, with its inevitable extravagance in money and time. This result is accomplished by simply turning a small hand wheel. It can be done at any time without in the least interfering with the work, or removing the rest, or any part of the machine, and requires but an instant to make them perfectly true.

Quality of Workmanship and Material.—It has been designed with great care to meet all the necessities of this class of work; the materials are the best obtainable, spindle of crucible steel, carefully ground to size; bolts and studs (where essential) of bronze metal; collars are turned all over, insuring a perfect balance.

DIMENSIONS.

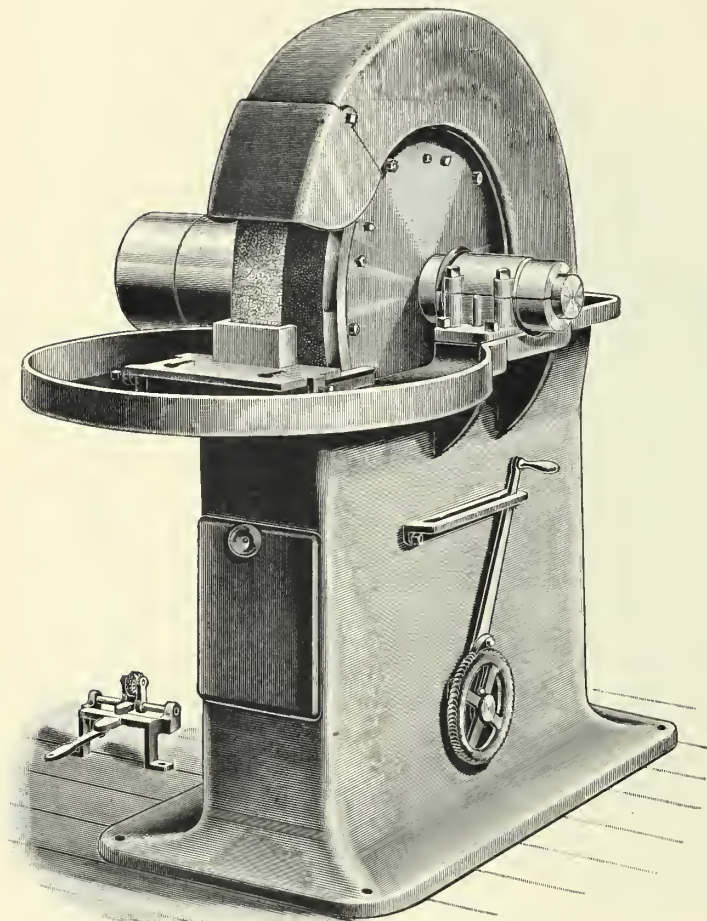
Spindle bearings, $2\frac{1}{8}$ inches, 8 inches long. Emery wheels, 24 inches diameter, $1\frac{1}{2}$ inch face. Distance between wheels, $25\frac{1}{2}$ inches. Weight, crated for shipment, 1750 pounds. Speed of countershaft, 440 revolutions per minute.

Price of machine, complete, with overhead works and two emery wheels, - - - \$200.00

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FIG. 377.

IMPROVED 20 AND 36 INCH TOOL GRINDER.



THIS is an entirely new and improved tool which combines several valuable features.

The round table in front allows the operator to always be at the same distance from the emery wheel, in whatever position he wishes to hold the tool.

The hood is in one piece, except the front, which, with the tool rest, is adjustable to the wear of the wheel.

The inside of hood is arranged to catch the water or spray, keeping it from the boxes and spindle.

The emery wheel collars are dovetailed and are fitted with a device for balancing the wheel.

Collars, pulleys and all running parts are turned inside and out, to obtain a perfect running machine. Dust collars are used to keep all emery and dirt from the bearings.

Water is supplied to the wheel by means of a water pan on the inside of the base. This pan is raised or lowered by means of a rack and pinion in connection with ratchet wheel and lever, shown on side of base.

The lever is pulled forward until the wheel touches the water in the pan, and is then dropped into a notch in the guide. This guide has four notches, thus allowing the operator to supply as much or as little water to the wheel as he may desire. Or the lever may be left in one of the notches in the guide and the wheel allowed to run constantly in the water or by a quick motion of the hand, the lever may be dropped back, allowing the wheel to run clear of the water. As the water decreases in the pan, more may be supplied by turning the ratchet wheel on the side of the

machine. When it is necessary to clean the pan, it may be very quickly drawn through the door in front of the base and fresh water supplied by pouring it into the table, from which it will run into the pan below.

Our machines all have long bearings and heavy spindles, and with our water arrangement they are always ready for use and need no repairs.

SPECIFICATIONS.

20 INCH TOOL GRINDER.

Emery wheel, 2½ in. or 3 in. face, as desired, diam.,	20 inches
Speed of wheel per minute, - - -	700 revolutions
Spindle, diameter, - - - - -	2 inches
Boxes, self-oiling, length each, - - -	6½ inches
Spindle pulleys, tight and loose, each, -	6 x 3½ inches
Height, floor to center of spindle, - - -	36 inches
Foot of base, - - - - -	20 x 30 inches
Floor space, over all, - - - - -	28 x 35 inches

36 INCH TOOL GRINDER.

Emery wheel 3 in. or 4 in. face, as desired, diam.,	36 inches
Speed of wheel per minute, - - -	400 revolutions
Spindle, diameter, - - - - -	3 inches
Boxes, self-oiling, length each, - - -	8 inches
Spindle pulleys, tight and loose, each, -	9 x 4½ inches
Height, floor to center of spindle, - - -	36 inches
Foot of base, - - - - -	24 x 46 inches
Floor space, over all, - - - - -	38 x 56 inches

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SINGLE WHEEL TOOL GRINDERS.

No. 2 TOOL GRINDER.

EMERY WHEEL, 18 x 2½ x 1¾ INCHES.

Weight, - - - - - 800 pounds
 Size of base, - - - - - 24 x 27 inches
 Height from floor to center of spindle, 38 inches
 Engine lathe boxes for bearings, each, 7 inches
 Diameter of spindle in bearings, 1½ inches
 Diameter of spindle between flanges, 1¾ inches
 Diameter of cone pulley on spindle, 5 and 6 x 4½ ins.
 Price complete, with countershaft and truing device, - - - - - \$150.00

Countershaft has tight and loose pulleys, 8 inches in diameter, 4¾ inch face. Cone pulley, 12 and 13 inches diameter, 4¾ inch face. The drop of hangers is 10 inches. Entire length of shaft, 32 inches. For our No. 2 Tool Grinder the countershaft should run 250 revolutions per minute. This will give the spindle, on the slowest speed, 500 revolutions; on the quickest speed, 600 revolutions per minute.

No. 3 TOOL GRINDER.

EMERY WHEEL, 24 x 3½ INCHES.

Weight, - - - - - 1500 pounds
 Size of base, - - - - - 26 x 40 inches
 Height from floor to center of spindle, 36 inches
 Engine lathe boxes for bearings, each, 8 inches long
 Diameter of spindle in bearings, 1¾ inches
 Diameter of spindle between flanges, 2 inches
 Diameter of pulley on spindle, 10 inch, 5 inch face

Our patented and special arrangements, shown and described for No. 2 Tool Grinder, are found in this machine, and all of our other sizes.

Price complete, with countershaft and truing device, - - - - - \$250.00

Countershaft for No. 3 Tool Grinder has tight and loose pulley, 10 inches diameter, 5¼ inch face. Driving pulley, 17 inches diameter, 6 inch face. Entire length of shaft, 40 inches, with drop of hangers, 12 inches.

It should run 260 to 280 revolutions per minute; this will give to the spindle on this machine a speed of from 400 to 450 revolutions per minute.

No. 4 TOOL GRINDER.

EMERY WHEEL, 30 x 4 INCHES.

Weight, - - - - -	2000 pounds	Length of bearings, each, - - -	9 inches
Size of base, - - - - -	28 x 45 inches	Diameter of spindle between flanges, - - -	3 inches
Height from floor to center of spindle, - - -	37 inches	Diameter of pulley on spindle, - - -	14 ins., 6 in. face

Price complete, with countershaft and truing device, - - - - - \$300.00

Countershaft for No. 4 Tool Grinder has tight and loose pulleys, 10 inches diameter, 6 inch face. Driving pulley, 18 inches diameter, 6 inch face. Entire length of shaft, 40 inches, with drop hangers, 12 inches.

Countershaft should run 260 to 280 revolutions per minute; this would give to the spindle on the machine a speed of 300 to 350 revolutions per minute.

No. 5 TOOL GRINDER.

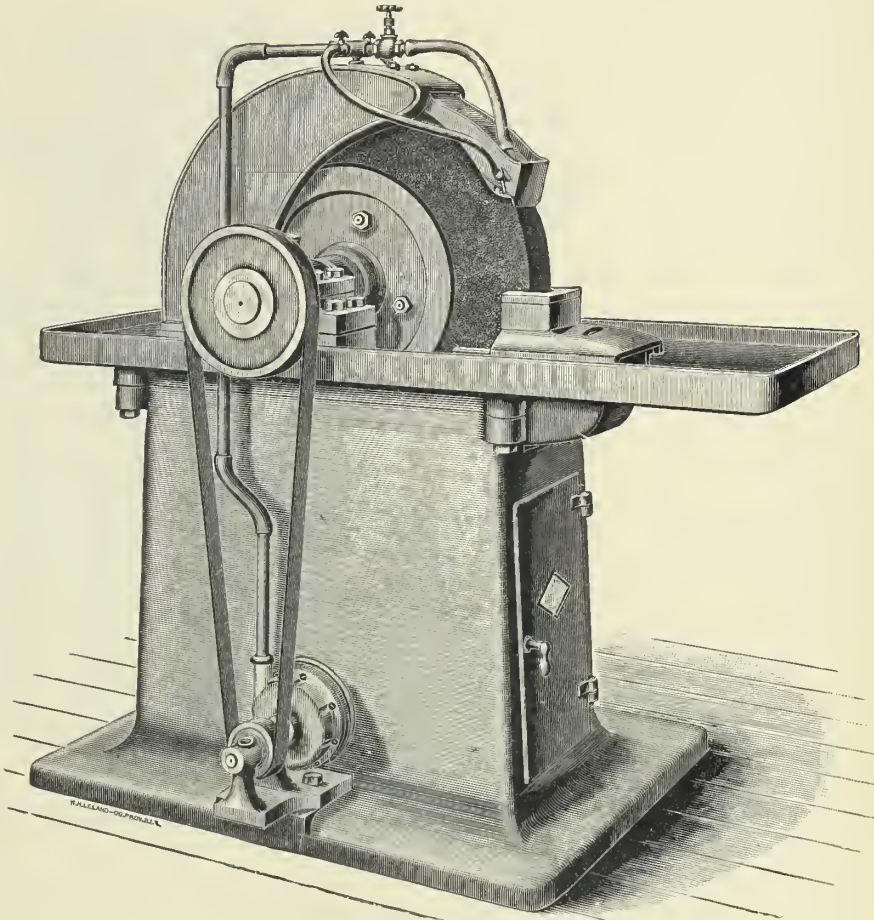
EMERY WHEEL, 36 x 4 INCHES.

Weight, - - - - -	2500 pounds	Length of bearings, each, - - -	10 inches
Size of base, - - - - -	28 x 51 inches	Diameter of spindle between flanges, - - -	3 inches
Height from floor to center of spindle, - - -	37 inches	Diameter of pulley on spindle, - - -	16 ins., 6 in. face

Price complete, with countershaft and truing device, - - - - - \$350.00

Machine should run 300 revolutions per minute. Countershaft for this machine same dimensions as No. 4 Tool Grinder countershaft.

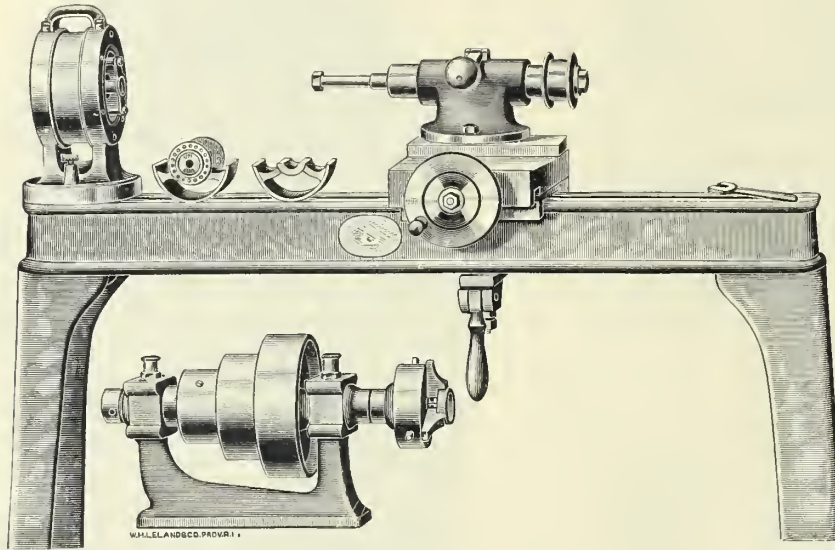
FIG. 378.



Improved and Patented August 1, 1882; May 7, 1889.

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FIG. 379.

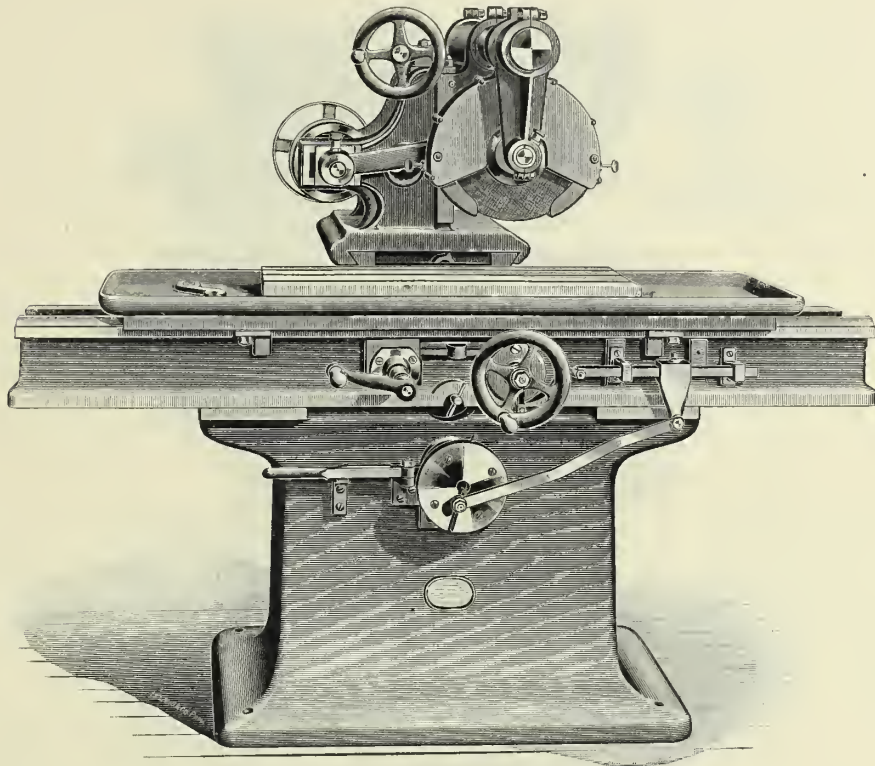


BALL BEARING GRINDING MACHINE.

THE MACHINE shown is of interest to all manufacturers of bicycles or bicycle parts. Makers of such goods who have used ground and true balls for their bearings found that it was essential to secure a true ground seat or surface for the balls to travel in, and that without it, the best results could not be obtained. This has called for the machine shown, to grind true and accurate the bearings in connection with the balls used. The machine is arranged with two heads and two styles of chucks. One of the heads and chucks holds the small circular hubs to be ground true for the balls to revolve in. The other head and special chuck is arranged to hold the bearings of the wheel hubs and pedals, both of which require a true smooth surface to give the best results. This latter head is arranged to grind one end of the bearings, after which the head is swung one-half way round without removing the work from the special chuck which holds it. This insures both ends being ground perfectly true and parallel with each other. The carriage in which the emery wheel revolves has movements by hand wheel and screw, both lateral and longitudinal. It is arranged with a swivel head to secure an angle. The emery spindle is made of steel with long bearing bronze split box, and fitted every way secure from emery dust. Also arranged to secure a high rate of speed for the emery wheel. There is one arbor provided to hold the small wheels, which latter is fitted to taper in the spindle head. There is one split chuck provided to hold emery plugs 3 inches long which as worn away can be brought forward from the chuck. The necessary countershafts and drums are supplied, all of which make this machine complete in all its appointments and satisfactory in its results to all manufacturers doing this class of work.

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FIG. 380.



AUTOMATIC SURFACE GRINDING MACHINE.

THIS MACHINE is intended for grinding flat metal surfaces, hard or soft, where great accuracy is required, or where the parts to be ground are hardened, so that other methods of truing the face are difficult. As will be seen from the cut, the machine has a very heavy base, supporting both the table and the wheel directly from the floor, thus insuring great rigidity and stiffness.

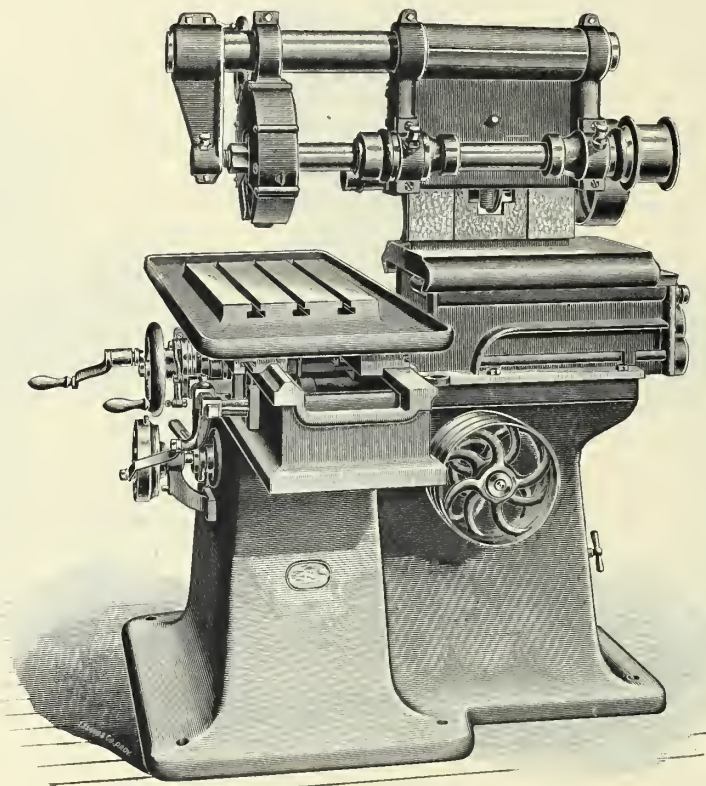
The bed which supports the table has suitable mechanism to automatically carry the work back and forth under the wheel, or the automatic features may be dispensed with at will, the table moved with the hand wheel, or run to one end of the bed and stopped entirely, to change the work, without stopping the emery wheel, or other parts of the machine. Adjustable stops are provided to limit the stroke to any desired length, or the lever in front of the machine may be used to stop and start the table instantly at any point desired by the operator.

The machine will grind the surface of its own table, thus insuring the accuracy of all work done upon it. The emery wheel spindle which is self-oiling is large in proportion to the diameter of the wheel, and is provided with ample bearings in length and diameter. The outer bearings are of bronze and are carried by an overhanging arm with self-oiling box and drip to keep the oil from the work.

The emery wheel is raised or lowered by a hand wheel and worm gear to give proper setting to the cut to be taken, and is capable of a very fine adjustment. Graduations on the hand wheel indicate the amount of this movement. The emery wheel has self-regulating cross feed in both directions, with adjustments to secure as much or as little feed as desired. The feed is arranged to shift at one end or at both ends of the table, thereby economizing greatly in time over a planer or milling machine, which cuts one way only. A guard is put on and around the table so that water may be used if desired. An automatic pump is furnished when ordered. Water and the pans connected with the same are enclosed inside of the column.

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FIG. 381.



AUTOMATIC SURFACE GRINDING MACHINE.

SIDE VIEW.

THE MACHINE shown (No. 3) will grind the surface of a piece of work 48 inches long, 12 inches wide and 9 inches thick. It is provided with a double countershaft carrying a drum for driving the emery wheel. Step cones give three speeds to the table. The dimensions of the machine shown are given below. Self-oiling boxes and dust protectors are used throughout.

DIMENSIONS.

Diameter emery wheel,	-	-	-	-	-	-	-	-	-	12 x 1 $\frac{1}{4}$ inches
Height of table from floor,	-	-	-	-	-	-	-	-	-	34 inches
Diameter of spindle in bearings, each	-	-	-	-	-	-	-	-	-	2 $\frac{1}{2}$ inches
Diameter of spindle between flanges,	-	-	-	-	-	-	-	-	-	1 $\frac{1}{2}$ inches
Length of spindle bearings, each	-	-	-	-	-	-	-	-	-	6 inches
Thickness of work to be ground,	-	-	-	-	-	-	-	-	-	0 to 9 inches
Floor space required,	-	-	-	-	-	-	-	-	-	40 x 44 inches
Tight and loose pulleys on countershaft,	-	-	-	-	-	-	-	-	-	10 x 4 $\frac{1}{2}$ inches
Speed of countershaft per minute,	-	-	-	-	-	-	-	-	-	350 revolutions

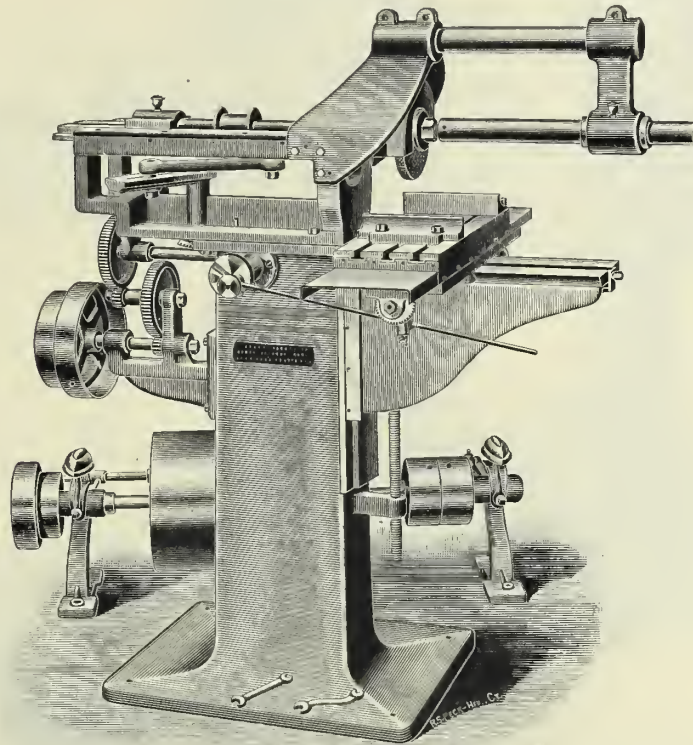
PRICE COMPLETE, WITH COUNTERSHAFTS, EMERY WHEELS AND WRENCHES.

No. 1, to grind work 24 x 12 x 9 inches	-	-	-	-	Weights 3000 pounds	-	-	-	-	\$500.00
" 2, " " 36 x 12 x 9 "	-	-	-	-	" 3500 "	-	-	-	-	550.00
" 3, " " 48 x 12 x 9 "	-	-	-	-	" 4000 "	-	-	-	-	600.00
" 4, " " 60 x 12 x 9 "	-	-	-	-	" 4500 "	-	-	-	-	650.00

Add \$25 to list price for automatic pump and connections.

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FIG. 382.



No. 02 SURFACE GRINDER.

THIS MACHINE is designed for general surface grinding, and particularly for grinding and finishing punches, dies and hardened parts of machinery requiring true surfaces.

The spindle and boxes are in a slide which carries the wheel across the work, being adjustable to the length of stroke desired by the crank under the slide.

The wheel, traveling across the work, wears evenly and cuts more easily, being less liable to glaze.

This machine grinds 14 inches wide, 32 inches long, and 12 inches high, under an 8 inch wheel.

It has an overhanging arm for supporting the wheel to prevent it springing on a long stroke.

Jaws for holding work on the table are furnished with each machine.

Speed of countershaft, 350 revolutions. Tight and loose pulleys, 6 inch diameter, $3\frac{1}{2}$ inch face.

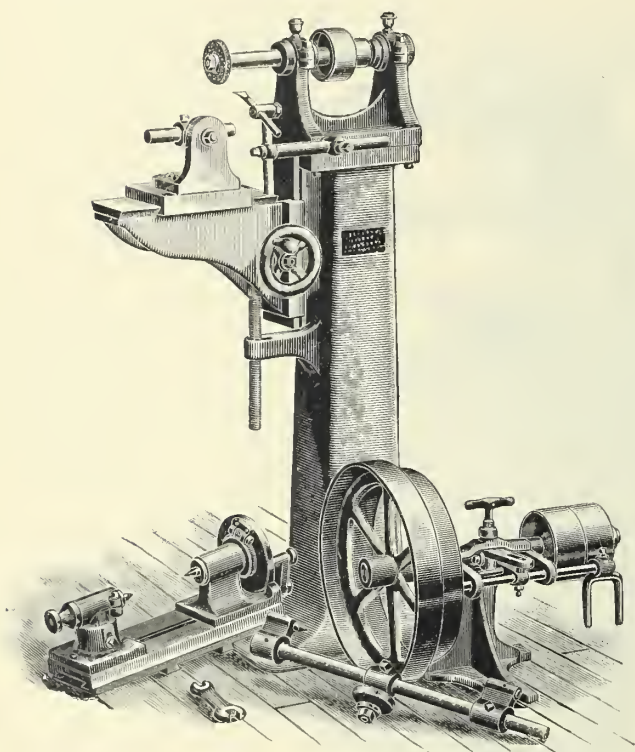
Weight, 1300 pounds.

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FIG. 383.

HAND SURFACE GRINDER, WITH AUTOMATIC FEED.

THIS MACHINE grinds 4 inches wide by 9 inches long. It is a very desirable tool for grinding or sharpening dies, punches, etc., and is adapted for general surface grinding. The lever carries the work under the wheel, and feeds with every stroke automatically in either direction.



No. 01 SURFACE GRINDER.

THIS MACHINE is adapted for grinding and finishing dies, punches and hardened parts of machinery requiring true surfaces.

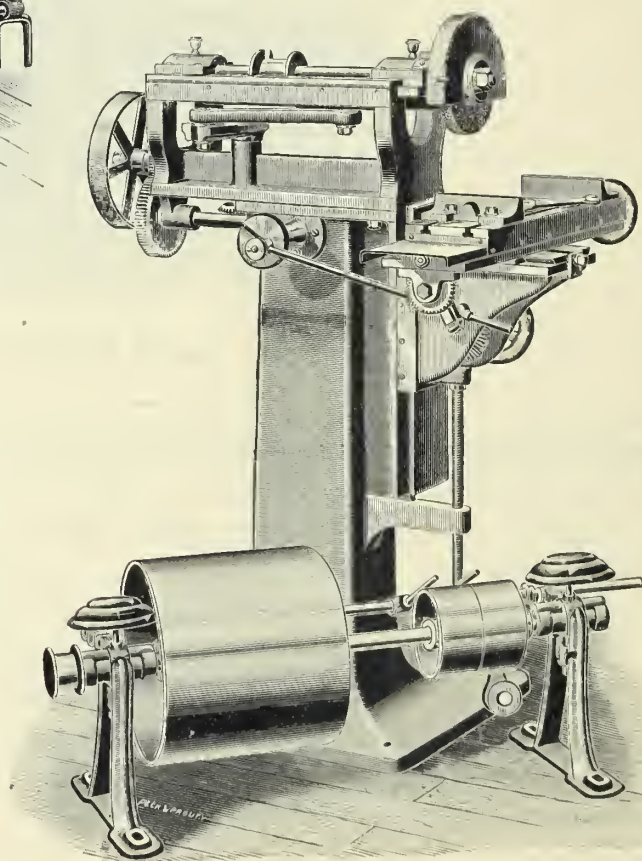
The spindle and boxes are in a slide which carries the wheel across the work, being adjustable to the length of stroke desired by the crank under the slide. The wheel traveling across the work wears evenly and cuts more easily, being less liable to glaze.

This machine will grind 8 inches wide and 18 inches long using an 8 inch wheel, and will take a piece 12 inches high. It has automatic feed and feeds in either direction.

Jaws for holding work on the table are furnished with each machine. The countershaft has tight and loose pulleys, 6 inches in diameter, $3\frac{1}{2}$ inch face, and should run 350 revolutions per minute for an 8 inch wheel.

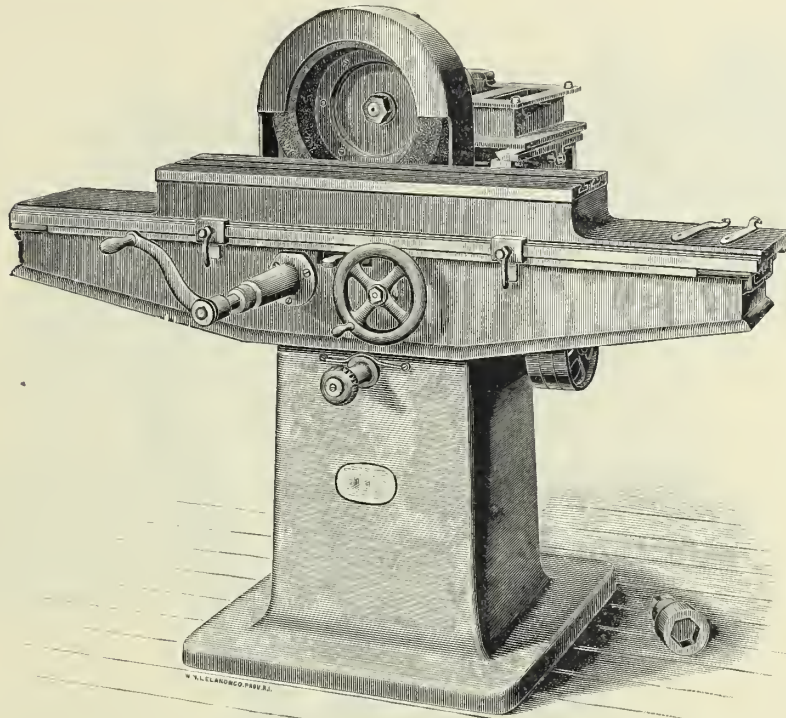
Weight, 900 pounds.

FIG. 384.



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FIG. 385.



FACE GRINDING MACHINE.

THIS MACHINE is adapted to a variety of grinding where a small amount of stock is to be removed, and a flat surface is desired, the pieces being held in suitable fixtures fastened to the platen, or clamped to the platen itself. The platen has a longitudinal movement sufficient to grind pieces 26 inches long, either by means of a hand wheel or crank shown, or by automatic power feed, the distance of movement being regulated by adjustable dogs or stops on edge of platen.

The head, which carries an annular or cup wheel 14 inches in diameter, has a transverse movement by means of a hand wheel for adjustment to the work, and to compensate for the wearing away of the wheel. This annular wheel can also be brought to the work by an automatic cross feed which admits of any adjustment from a thousandth of an inch feed up to one-sixteenth or more. This latter feed is not supplied to the machine unless ordered, and then at an additional price of \$37.50 to the list given.

We can arrange this machine to remove the wheel head, spindle and cup wheel shown, in its place providing a new head with a disk wheel up to 14 inches in diameter, having a rise and fall by means of a hand wheel and square thread screw attached, which will admit of placing under the wheel work to the thickness of ten inches or less for surface grinding.

An automatic cross feed is provided that will give to the wheel a grinding surface of ten inches across the face of the work, thus securing full automatic feed both in length and width of the surface to be ground.

We will furnish price of machine so arranged with all details, upon application.

The bearings are well protected from dust, and provision is made for attachment of an exhaust fan.

The countershaft has tight and loose pulleys 10 inches diameter with $4\frac{3}{8}$ inch face, with the necessary pulleys for driving the wheel and machine, and should run 280 turns per minute.

Size of base on floor, 36 x 58. Height from floor to center of spindle, 38 inches.

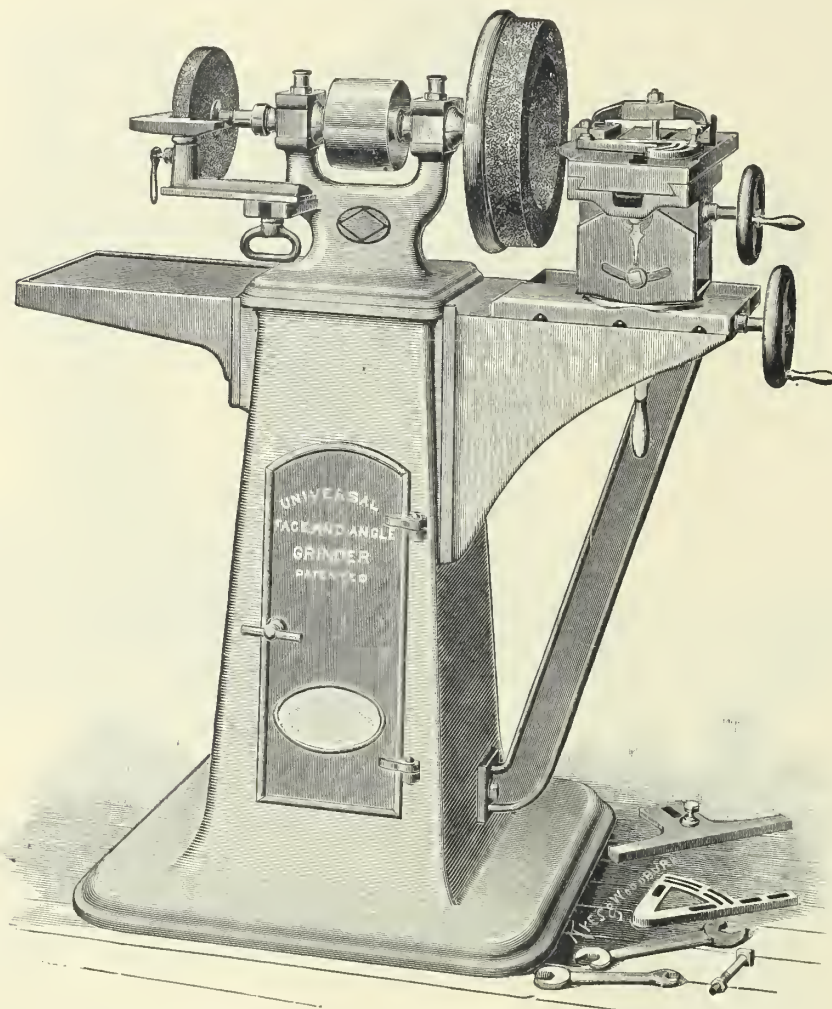
No. 1,	26 inch	face grinder, including wheel and with countershaft,	weight, 1400 pounds,	\$267.50
" 2,	30 "	" " " " " "	" 1600 "	287.50
" 3,	36 "	" " " " " "	" 1800 "	325.00
" 4,	50 "	" " " " " "	" 2000 "	400.00
" 5,	60 "	" " " " " "	" 2500 "	475.00

Add \$25.00 to list price for automatic pump and connections.

Add \$37.50 additional to list price for automatic cross feed of the wheel to the work.

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FIG. 386.



No. 1 UNIVERSAL FACE AND ANGLE GRINDER.

THIS MACHINE is well adapted to a large variety of grinding, where but a small amount of stock is to be removed and a flat, true surface is desired, the pieces being held in suitable fixtures fastened to the platen or clamped to the platen itself. The platen has a longitudinal movement by means of a hand wheel sufficient to grind pieces 12 inches long. It has knee furnished with angle irons adjustable on said platen, and moves laterally by hand to the annular wheel as the latter is worn away. It has sufficient length to keep the slides or wearing parts of the machine always covered.

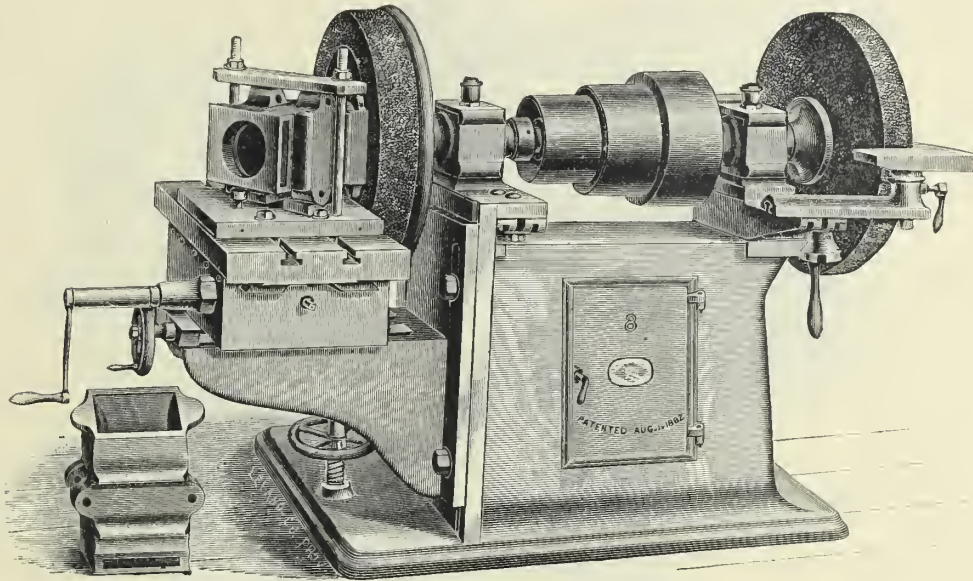
The table or platen is adjustable to any degree or pitch, and furnished with a graduated index finger, enabling the operator to set and reset it upon the same angle to grind bevel surfaces alike and true. It has a graduated base with additional movement about a central pivot, and can be turned at any angle.

The head carries an annular or cup wheel on one end 12 inches in diameter, $3\frac{1}{4}$ inches deep outside measure, with 2-inch rim. The other end is provided with taper hole and arbor, the latter arranged to hold wheel 9 inches diameter for light tool grinding.

Price, with adjustable platen and revolving base, with 12 inch annular wheel and emery wheel 8 x 1, with taper arbor, countershaft and wrenches,	\$250.00
Where ordered without pivotal adjustment to base,	225.00
Weight, boxed for shipment, 1000 pounds.	

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FIG. 387.



CAR BOX GRINDING MACHINE.

THE MACHINE is designed to run two wheels, as shown. Cup wheel is 22 inches in diameter and 6 inch face, with 16 inch hole, and 3 inch cutting surface. Emery wheel can be used on the other end of spindle, 34 inches in diameter, and 6 inch face.

It is made to grind car boxes or other straight surfaces.

The table measures 36 inches long by 13 inches wide. The length of parallel traverse is 18 inches, which can be increased to 30 inches if ordered. The end or cross traverse is 6 inches. The rise and fall to the knee is 8 inches. The movements of the table are by hand wheels, as shown.

We claim for the machine, great strength in its design, unequaled workmanship, and that it is constructed to do the work named or other straight surfaces perfectly true and in a rapid, economical manner, with every adjustment which can be required in a machine of this class.

Has steel spindle, engine lathe boxes, arm for rest, both front and back; rest being provided with wrench permanently attached to its proper place, and levers for securing the rests firmly to the frame; this latter is an invention (patented Aug. 1 1882) which every manufacturer will appreciate. The bearings are so close as to prevent the admission of emery dust. Brass oil cups with patent oil feeders are used. A surface attachment to use on this machine can be provided when desired.

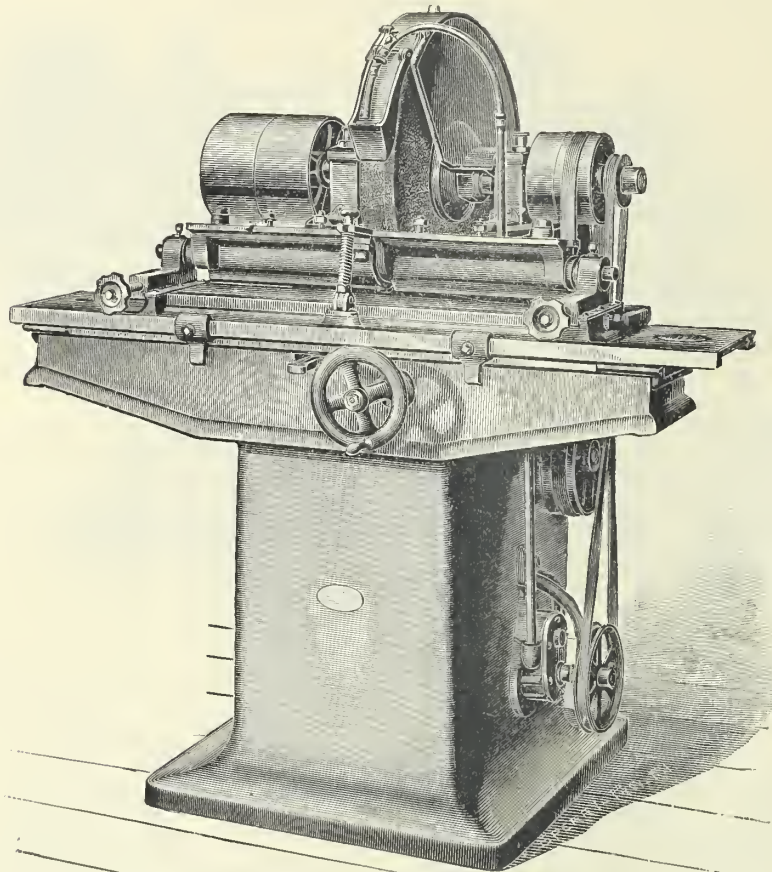
No railroad shop in the country can afford to be without this machine.

Weight of car box machine with countershaft,	- - - - -	2000 pounds
Distance between wheels,	- - - - -	40 inches
Length of bearings,	- - - - -	9 inches
Diameter of spindle in bearings,	- - - - -	2 1/4 inches
Diameter of spindle between flanges,	- - - - -	2 inches
Height from floor to center of spindle,	- - - - -	32 inches
Diameter of flanges,	- - - - -	8 inches
Size of cones on spindles,	- - - - -	8, 10 and 12 x 5 1/4 inches
Size of base,	- - - - -	26 x 38 inches
Size of tight and loose pulleys on countershaft,	- - - - -	10 x 5 1/4 inches
Size of cone pulley on countershaft,	- - - - -	14, 16 and 18 x 5 1/4 inches
Speed of countershaft per minute,	- - - - -	350 revolutions

Price of machine, countershaft, emery wheel and holder, shown,	- - - - -	\$400.00
Price of surface attachment,	- - - - -	75.00
Price of adjustable holder for emery wheel,	- - - - -	60.00

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FIG. 388.



IMPROVED AUTOMATIC KNIFE GRINDER.

THE MACHINE shown is designed to grind knives or other work thirty inches long. It has automatic power feed. The angle iron upon which the knife or work to be ground is held is arranged with slot provided so that the emery wheel will grind directly towards the edge of the knife. The angle iron can be reversed and the knife ground towards the butt or away from the edge. The table or platen upon which the angle iron (holding the knife) is held, brings the work to the wheel by small hand screw wheels at each end of the platen. This arrangement is such that when both ends of the work to be ground touch the wheel and are supposed to be parallel, then, to keep and retain the work in its parallel lines, the operator brings the emery wheel forward by the larger hand wheel directly in front of machine.

The center of the angle (or knife bar) is encircled by a split yoke. Loosen the yoke screw and you can swivel angle iron in any desired position or pitch to the wheel. Long bearings are an especial feature of the machine, with every provision known in our experience for excluding the emery dust. The platen or table is exceptionally wide, furnished with extra width of ways to traverse upon. The machine is made with tight and loose pulley, or single pulley.

The water hood is so arranged that all water is distributed directly on the wheel in front of knife or cutters being ground and thus prevents drawing the temper. The inside hood leads all water and spray directly back to tank, which has our patent siphon arrangement connecting with the lower tank. This device patented May 7, 1889.

No water will pass outside the hood or from the wheel in any manner beyond the table, which is so arranged that it does not stand on the machine. The pump is made upon a new and improved principle, being compact, well made, and non-corrosive.

We will furnish this machine with water pot overhead and necessary drip and pans for list prices named. This requires the operator to fill the water pot over the wheel when empty.

Size of base on floor, 26 x 32 inches.

Height from floor to center of spindle, 38 inches.

26 inch knife grinder, with	24 inch wheel, tight and loose pulley, weight	1200 pounds,	-	-	\$187.50
30 "	" " " " " "	1400 pounds,	-	-	200.00
36 "	" " " " " "	1600 pounds,	-	-	250.00
50 "	" " " " " "	1800 pounds,	-	-	300.00
60 "	" " " " " "	2500 pounds,	-	-	350.00
80 "	" " " " " "	3000 pounds,	-	-	450.00

Add \$25.00 to list prices given for automatic cross feed of the wheel to the work.

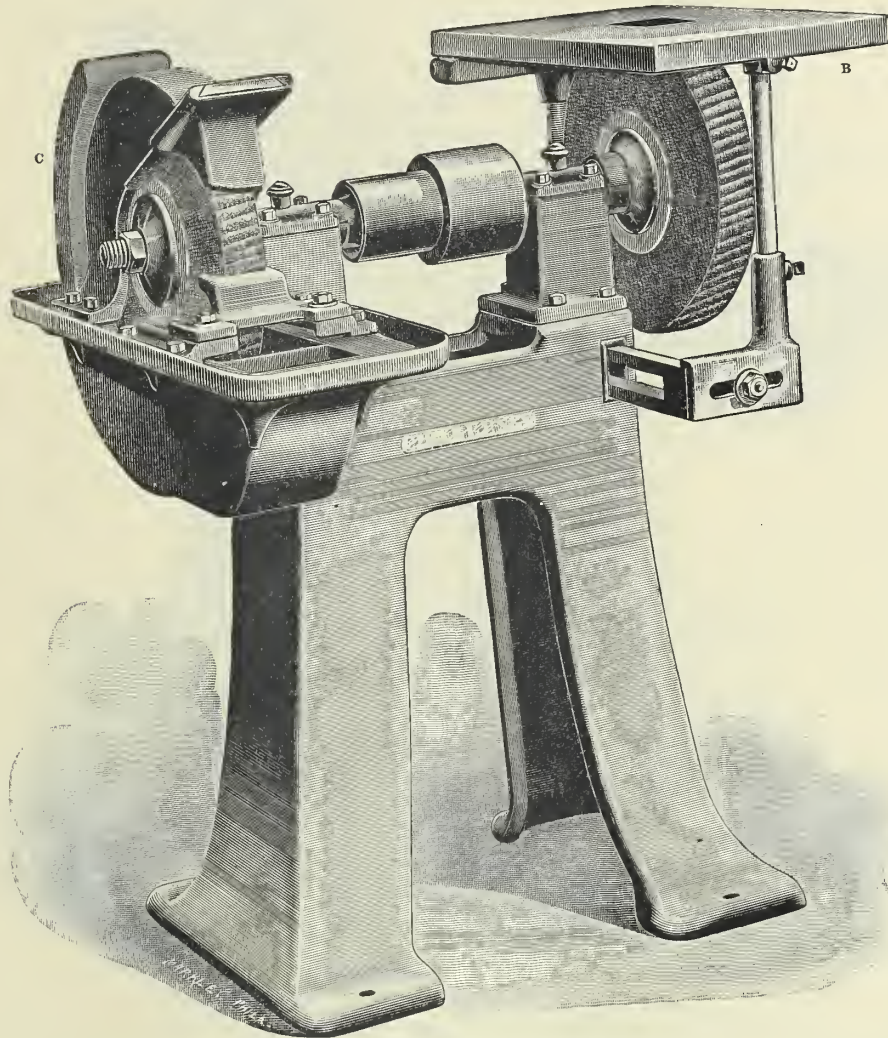
Add \$25.00 to list prices for automatic pump and connections. Price of countershaft for this machine, \$18.00.

Countershaft has tight and loose pulley, 10 x 4½. Drop of hangers, 10 inches. Single driving pulley, 14 x 4½.

Countershaft should make 200 revolutions per minute, which will give to speed of emery wheel 385 revolutions per minute.

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FIG. 389.



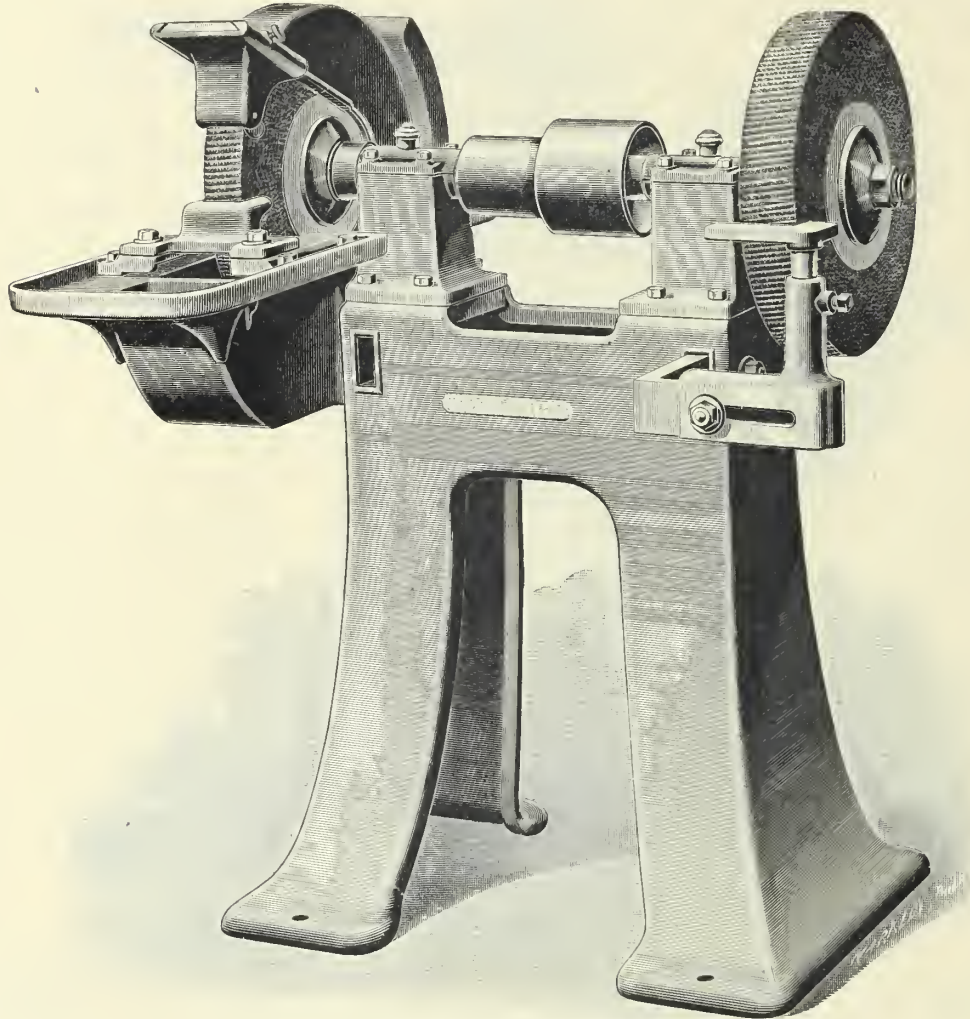
WET AND SURFACE GRINDERS.

PRICES, DIMENSIONS, ETC.

Number.	Size Wheels Deduct 2 inches for Wet Wheel. Last figure de- notes hole.	Price as in cut in- cluding Wet Wheel.	Price Counter.	Slow Speed Counter.	Driving Pulley on Counter.	T. & L. Pulley on Counter.	Pulley on Spindle.	Spindle Steel.	Bearings.	Weight Machine.	Weight Counter.	Height to Center Spindle.
E	18 x 2 x 1¼	\$165	\$15	425	9½ and 11 x 4	7 x 4	4 and 5½ x 4¼	35 x 1⅜	6 x 1⅜	600	100	36
F	20 x 2½ x 1½	213	20	550	9½ and 11 x 4¼	7 x 4¼	4 and 5½ x 4¼	38 x 1⅝	7½ x 1⅝	725	120	36
G	24 x 3 x 1¾	280	25	500	13 and 12 x 4½	8 x 4½	6 and 7 x 4½	48 x 1⅞	9 x 1⅞	1000	150	34
H	30 x 4 x 2	425	35	410	16 and 18 x 5½	10 x 5½	7 and 9 x 5½	58 x 2¼	12 x 2¼	1700	300	32

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FIG. 390.



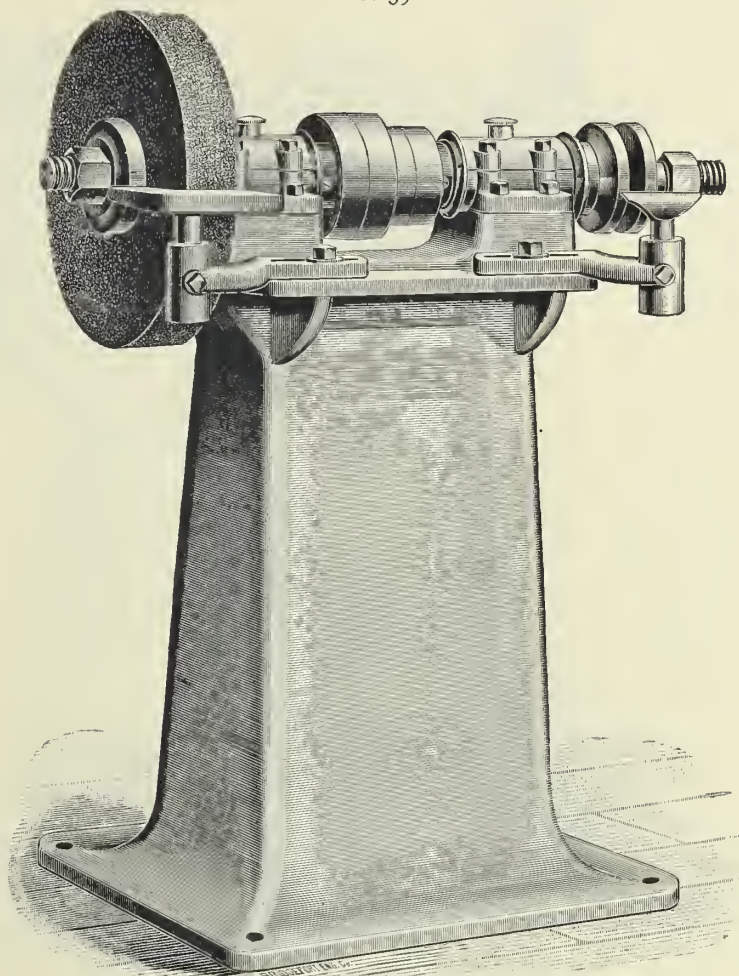
WET AND PLAIN DRY GRINDERS.

PRICES, DIMENSIONS, ETC.

Number.	Size Wheel. Deduct 2 inches for Wet Wheel. Last Figure is hole.	Price as in Cut inc. Wet Wheel.	Price Double Plain Grinder as above.	Price Counter.	Slow Speed Counter.	Driving Pulley on Counter.	T. & L. Pulley on Counter.	Pulley on Spindle.	Spindle Steel.	Bearings.	Weight as in Cut.	Weight Double Plain Grinder.	Weight Counter.	Height to Centre Spindle.	Price Set Plain Rests	Price Wet Wheel Guard inc. Wheel.	Price Surface Attachment.
E	18 x 2 x 1 1/4	\$135	\$80	\$15	425	9 1/2 and 11 x 4	7 x 4	4 and 5 1/2 x 4 1/4	35 x 1 3/8	6 x 1 3/8	500	375	105	36	\$10	\$55	\$40
F	20 x 2 1/2 x 1 1/2	175	95	20	550	9 1/2 and 11 x 4 1/4	7 x 4 1/4	4 and 5 1/2 x 4 1/4	38 x 1 5/8	7 1/2 x 1 5/8	600	450	105	36	12	80	50
G	24 x 3 x 1 3/4	235	115	25	500	13 and 12 x 4 1/2	8 x 4 1/2	6 and 7 x 4 1/2	48 x 1 7/8	9 x 1 7/8	875	725	150	34	15	120	60
H	30 x 4 x 2	375	200	35	410	16 and 18 x 5 1/2	10 x 5 1/2	7 and 9 x 5 1/2	58 x 2 1/4	12 x 2 1/4	1500	1250	300	32	20	175	70

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FIG. 391.



DRY GRINDERS.

THIS MACHINE embodies a number of salient features. The wide flare of the base gives increased steadiness on the floor. The long boxes decrease the vibration, and with the large spindles insure a steady running wheel and perfect alignment, thus adding to the life of the machine. The extra width between wheels admits of two men using the machine at the same time. The boxes are protected from dust, etc., by special dust proof collars on the end. The machine is built throughout in a most thorough manner.

No. 8 DRY GRINDER.

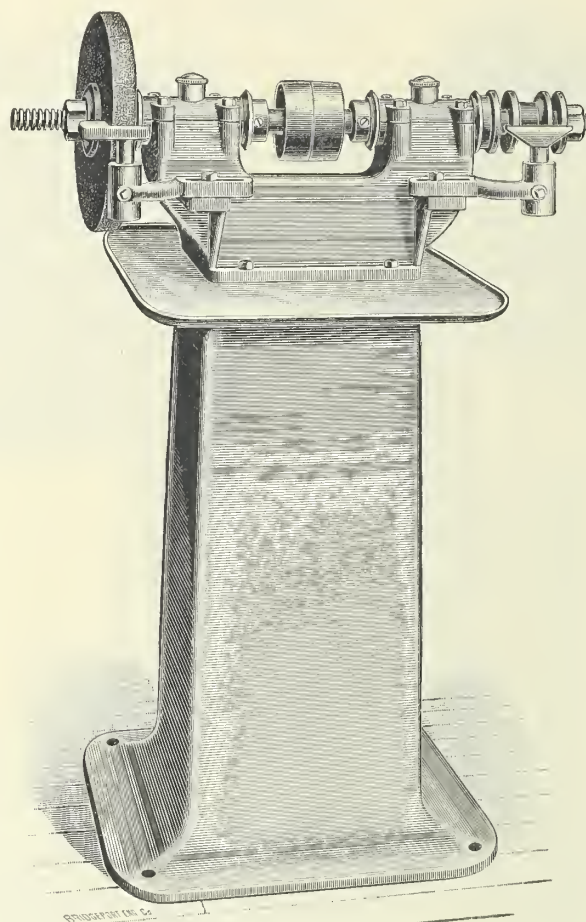
Emery wheels, diameter, - - -	20 inches
Speed of wheels per minute, - - -	960 revolutions
Distance between wheels, - - -	32 inches
Length of spindle, - - -	45 inches
Diameter of spindle in bearings, - - -	1 7/8 inches
Diameter of spindle between collars, - - -	1 3/4 inches
Boxes, length of each, - - -	8 inches
Spindle cone pulleys, - - -	6 and 4x3 1/2 inches
Height from floor to center of spindle, - - -	34 inches
Price, without countershaft, - - -	\$90.00
Price, with countershaft, - - -	105.00

No. 7 DRY GRINDER.

Emery wheels, diameter, - - -	16 inches
Speed of wheels per minute, - - -	1200 revolutions
Distance between wheels, - - -	26 inches
Length of spindle, - - -	37 inches
Diameter of spindle in bearings, - - -	1 3/8 inches
Diameter of spindle between collars, - - -	1 1/2 inches
Boxes, length of each, - - -	7 inches
Spindle cone pulleys, - - -	5 1/2 and 3 1/2 x 3 1/2 inches
Height from floor to center of spindle, - - -	36 inches
Foot of base, - - -	22x28 inches
Floor space, over all, - - -	22x37 inches
Price, without countershaft, - - -	\$60.00
Price, with countershaft, - - -	75.00

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FIG. 392.



DRY GRINDERS.

THIS MACHINE, although somewhat smaller than numbers 7 and 8, has the same excellent features; the wide flare of base, the long boxes, the heavy spindle and great width between wheels. It is also fitted with a small table, whereon tools, etc., may be laid, or if desired this table may be left off.

SINGLE WHEEL DRY GRINDER.

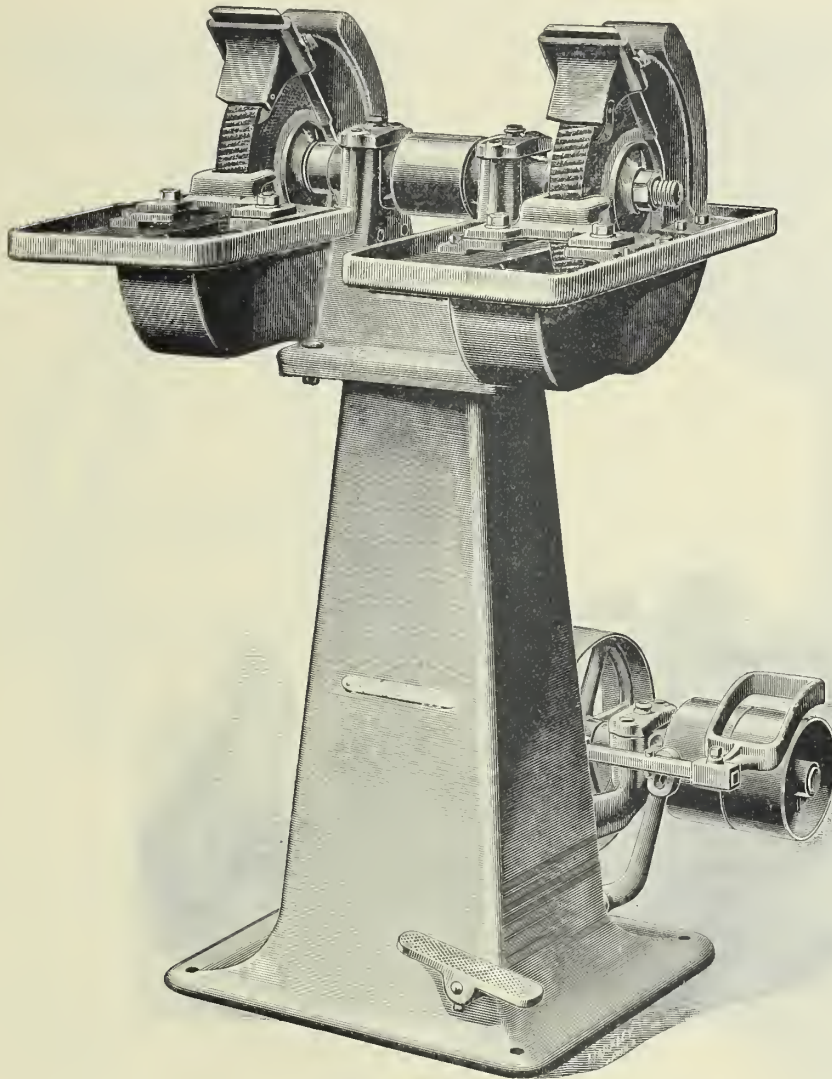
Emery wheel,	-	-	-	24x4 inches
Speed of wheel per minute,	-	-	-	850 revolutions
Length of spindle,	-	-	-	28 inches
Diameter of spindle in bearings,	-	-	-	1 3/4 inches
Diameter of spindle between collars,	-	-	-	2 inches
Boxes, length of each,	-	-	-	8 inches
Spindle pulley,	-	-	-	6x4 inches
Height from floor to center of spindle,	-	-	-	31 inches
Floor space, over all,	-	-	-	28x46 inches
Price, without countershaft,	-	-	-	\$84.00
Price, with countershaft,	-	-	-	100.00

No. 5 DRY GRINDER.

Emery wheels, diameter,	-	-	-	2 12 inches or 4 10 inches
Distance between wheels,	-	-	-	18 inches
Length of spindle,	-	-	-	28 inches
Diameter of spindle in bearings,	-	-	-	1 1/8 inches
Diameter of spindle between collars,	-	-	-	1 inch
Boxes, length of each,	-	-	-	5 inches
Spindle pulley,	-	-	-	3 1/2 x 2 3/4 inches
Height from floor to center of spindle,	-	-	-	40 inches
Foot of base,	-	-	-	16x20 inches
Floor space, over all,	-	-	-	16x28 inches
Price, without countershaft,	-	-	-	\$40.00
Price, with countershaft,	-	-	-	50.00

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FIG. 393.



DOUBLE WET GRINDER.

PRICES.

Number.	Size Wheels Last figure is hole.	Bench Machine including Wheels.	Overhead Counter.	Plain Base to belt to Overhead Counter.	Counter Base to belt to Main Shaft.
B	8 x 1 x ¾	\$75	\$10	\$85	\$100
C	10 x 1½ x 1	95	12	107	125
D	12 x 2 x 1	115	15	130	150

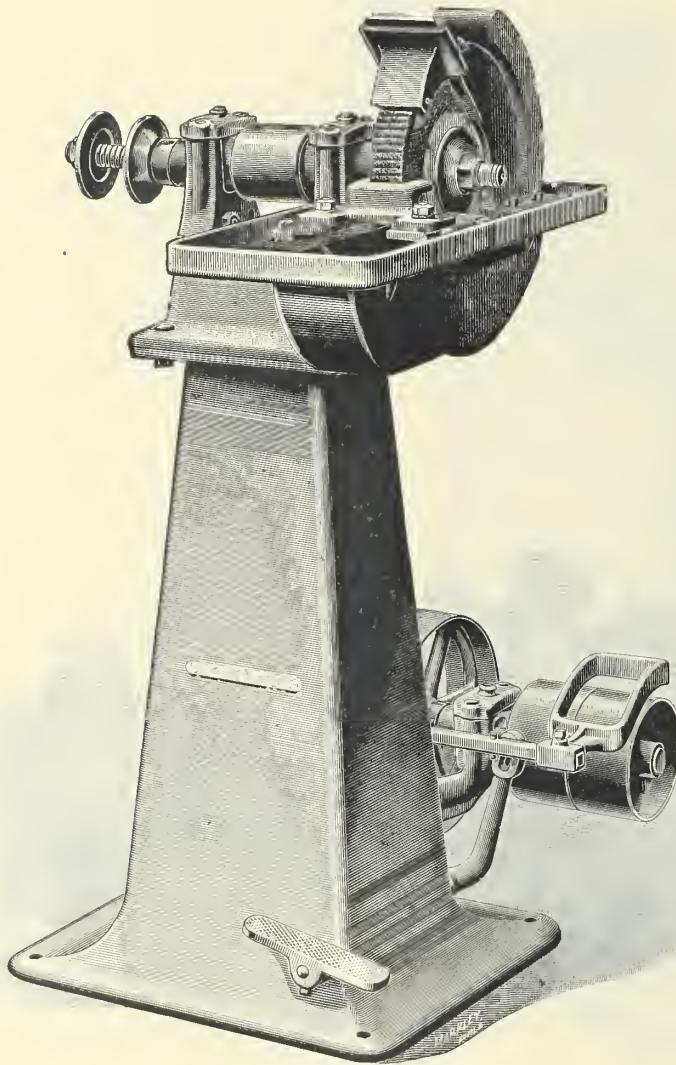
DOUBLE DRY GRINDER.

PRICES.

Number.	Size Wheels. Last figure is hole.	Bench Machine.	Overhead Counter.	Plain Base to belt to Overhead Counter.	Counter Base to belt to Main Shaft.
B	10 x 1 x ¾	\$25	\$10	\$35	\$50
C	12 x 1½ x 1	35	12	47	65
D	14 x 2 x 1	45	15	60	80

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FIG. 395.



SINGLE WET WHEEL GRINDER.

PRICES.

Number.	Size Wet Wheel. Other Wheel 2 inches larger Last figure is hole.	Bench Machine including Wheel.	Overhead Counter.	Plain Base to belt to Overhead Counter.	Counter Base to belt to Main Shaft
B	8 x 1 x $\frac{3}{4}$	\$47	\$10	\$57	\$72
C	10 x 1 $\frac{1}{2}$ x 1	62	12	74	92
D	12 x 2 x 1	77	15	92	112

DRY AND SERVICE GRINDER.

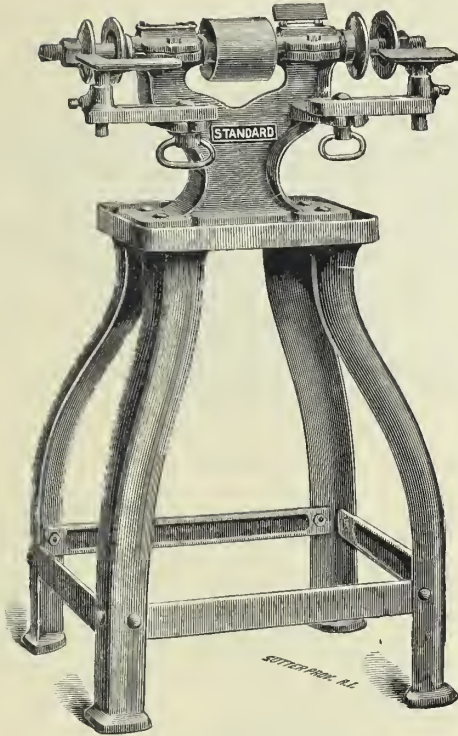
PRICES.

Number.	Size Wheel. Last figure is hole.	Bench Machine.	Overhead Counter.	Plain Base to belt to Overhead Counter.	Counter Base to belt to Main Shaft.
B	10 x 1 x $\frac{3}{4}$	\$42	\$10	\$52	\$67
C	12 x 1 $\frac{1}{2}$ x 1	57	12	69	87
D	14 x 2 x 1	72	15	87	107

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FIG. 397.

STANDARD GRINDING MACHINE.



THIS MACHINE is designed to run two wheels, 14 inches in diameter. It has Babbitt or cast-iron boxes, as desired, the frame constituting the lower half of the box, and the cap over the spindle the other half. Case-hardened cap screws are used with steel spindles. The machine is well made and designed to supply the demand for a low price, well made grinder.

Price of Standard Grinding Machine as shown,	-	-	-	\$30.00
Price of Standard Grinding Machine head,	-	-	-	20.00
Price of Standard Grinding Machine countershaft,	-	-	-	10.00

DIMENSIONS OF STANDARD GRINDER.

Size of base,	-	-	-	-	-	-	13 x 6 inches
Height from bench to center of spindle,	-	-	-	-	-	-	10 inches
Length of bearings,	-	-	-	-	-	-	4½ inches
Length of spindle,	-	-	-	-	-	-	25½ inches
Diameter of spindle in bearings,	-	-	-	-	-	-	1¼ inches
Diameter of spindle between flanges,	-	-	-	-	-	-	1 inch
Size of pulley on spindle,	-	-	-	-	-	-	4 x 3¾ inches
Distance between wheels,	-	-	-	-	-	-	16 inches

GRINDING MACHINE No. 4.

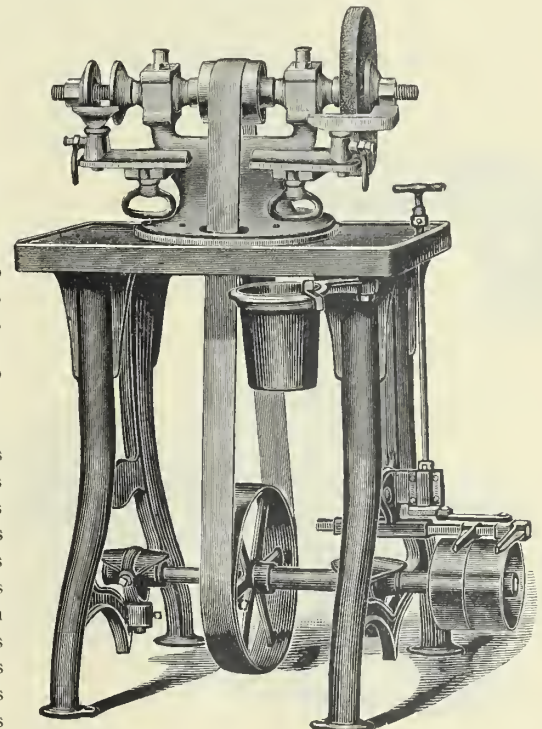
NEW PATTERN, IMPROVED AND ENLARGED. MOUNTED ON FRAME, WITH DRIVING SHAFT AND HADLEY'S PATENT BELT SHIFTER ATTACHED.

Price of No. 4 Grinding Machine, stand, and driving shaft, as shown,	\$60.00
Price of No. 4 Grinding Machine head,	28.00
Price of frame with water pot attached,	17.00
Price of driving shaft and patent belt shifter attached, as shown, or Hadley's patent countershaft, for overhead use,	15.00

DIMENSIONS OF GRINDING MACHINE No. 4.

Weight (with frame and countershaft),	-	-	-	300 pounds
Size of base,	-	-	-	12 x 8½ inches
Height from bench to center of spindle,	-	-	-	9 inches
Distance between wheels,	-	-	-	15 inches
Length of bearings,	-	-	-	4 inches
Diameter of spindle in bearings,	-	-	-	1⅞ inches
Diameter of spindle between flanges,	-	-	-	1 inch
Size of pulley on spindle,	-	-	-	4 x 3½ inches
Height of stand from floor to top of iron table,	-	-	-	28 inches
Size of iron table,	-	-	-	25 x 14 inches
Weight of stand,	-	-	-	175 pounds

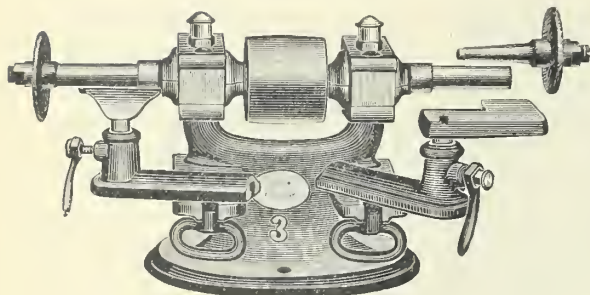
FIG. 398.



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BENCH GRINDERS, Nos. 2, 3, 4 and 5.

FIG. 399.



Number.	Size Wheels, Last figure is hole.	Price.	Price Counter.	Price on Plain Col- umn to belt over- head.	Price on Counter Column to belt to Main Shaft.	Speed Counter.	Driving Pulley on Counter.	Pulley on Spindle.	Spindle, Steel.	Height to Centre Spindle.	Weight Machine.	Weight Counter.
2	8x1x3/4	\$10 00	\$7 50	\$20 00	\$27 50	400	9x2 1/2	2 1/4 x 2	13 3/4 x 1	5 1/4	20	45
3	10x1 1/2 x 1	15 00	10 00	27 00	40 00	450	9x2 1/2	3 1/4 x 3	20 1/2 x 11-16	7 3/4	50	60
4	10x2x1	20 00	10 00	35 00	50 00	475	12x2 1/2	3 3/4 x 3 1/2	24 x 1 3-16	9 1/2	70	60
5	16x2x1 1/4	35 00	15 00	55 00	75 00	425	9 1/2 x 11x4	4 x 5 1/2 x 4 1/4	32 1/2 x 1 3/8	11 1/2	155	110

No. 5 has cone pulley. All have long capped boxes and knuckle-jointed rests.

BENCH SURFACE GRINDERS, Nos. 3, 4 and 5.

Number.	Size Wheels, Last figure is hole.	Price.	Price Counter.	Price on Plain Col- umn to belt over- head.	Price on Counter Column to belt to Main Shaft.	Speed Counter.	Driving Pulley on Counter.	Pulley on Spindle.	Spindle, Steel	Height to Centre Spindle.	Weight Machine.	Weight Counter.	Work passes over slot in table. Has screw adjust- ment.
3	10x1 1/2 x 1	\$35 00	\$10 00	\$47 00	\$60 00	450	12x3 1/4	3 1/4 x 3	20 1/2 x 11-16	7 3/4	90	60	
4	12x2x1	45 00	10 00	60 00	75 00	475	12x3 1/4	3 3/4 x 3 1/2	24 x 13-16	9 1/2	115	60	
5	16x2x1 1/4	70 00	15 00	90 00	110 00	425	9 1/2 x 11x4	4 x 5 1/2 x 4 1/4	32 1/2 x 1 3/8	11 1/2	240	110	

FIG. 401.

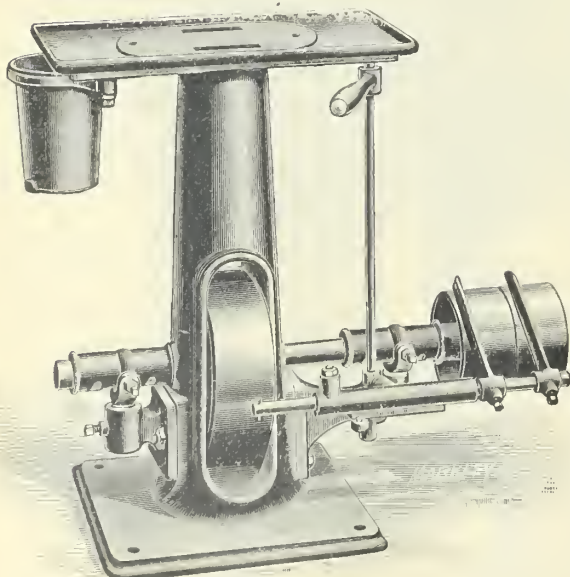


FIG. 401.—Countershaft column furnished for mounted head shown above, for belting direct to main shaft.

Plain columns also furnished and used for belting heads to overhead countershafts, and are solid.

Price, No. 1 or 2, \$17.50; No. 3, \$25; No. 4, \$30; No. 5, \$40.

Price plain columns, No. 1 or 2, \$10; No. 3, \$12; No. 4, \$15; No. 5, \$20.

FIG. 402. Countershaft tables are furnished for No. 3 and No. 4 heads only. They are for belting direct to the main shaft.

Plain tables are also furnished for No. 3 and No. 4 heads only. They are for belting heads to overhead countershaft—counter on table being removed.

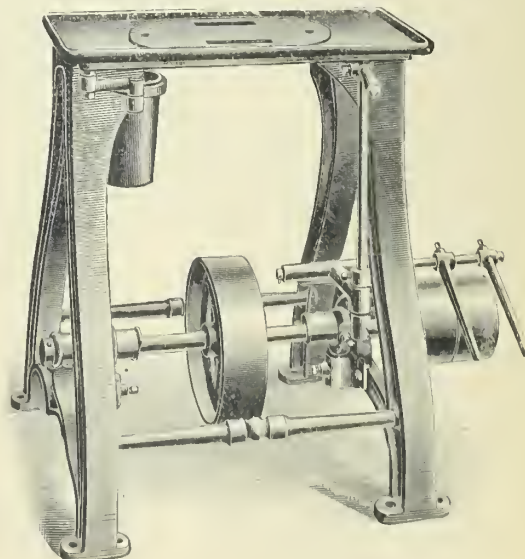
Price countershaft table, No. 3, \$25; No. 4, \$30.

Price plain table, No. 3, \$12; No. 4, \$15.

Weight countershaft tables, No. 3, 135; No. 4, 150.

Weight plain tables, No. 3, 100; No. 4, 120.

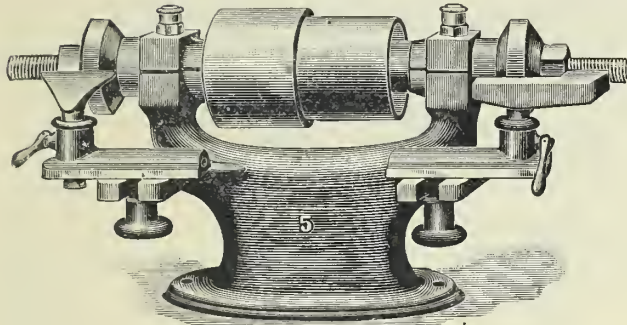
FIG. 402.



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HEAD GRINDER, COUNTERSHAFT AND COLUMNS.

FIG. 403.

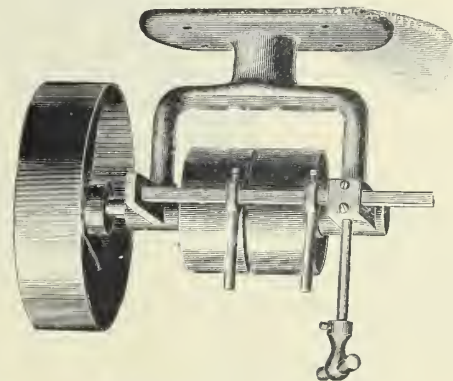


Grinder No. 5.

This is a heavy substantial machine, will carry 18x3 inch wheel.

Length of steel arbor, - - - - -	32½ inches
Cone pulley, - - - - -	6x4½ and 5x4½ inches
Journals, - - - - -	5x1⅝ inches
Distance between wheels, - - - - -	22 inches
Spindle between collars, - - - - -	1¼ inches
Distance from bench to spindle, - - - - -	12 inches
Weight without counter, - - - - -	160 pounds
Price, - - - - -	\$35.00

FIG. 404.



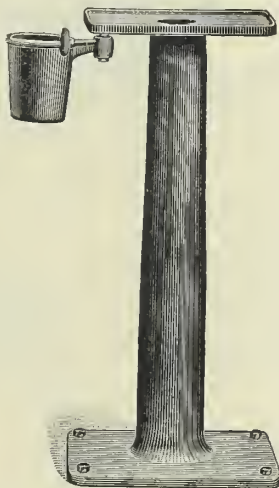
Countershafts Nos. 1 and 2.

Number 1 is used with No. 1 and No. 2 grinders.

Number 2 counter with Nos 3 and 4 grinders.

Tight and loose pulleys, - - - - -	No. 1, 4x1¾ in.	No. 2, 6x3¼ in
Driving pulleys, - - - - -	No. 1, 10x2 in.	No. 2, 12x3¾ in
Price, - - - - -	\$10.00	\$15.00

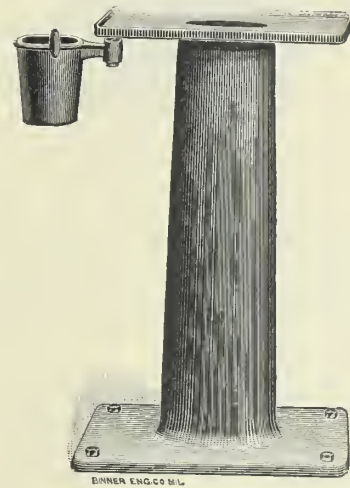
FIG. 405.



Iron Column No. 1.

Size of base, - - - - -	14x16
Size of table, - - - - -	12x14
Height, - - - - -	32 inches
Weight, - - - - -	90 pounds
Price, - - - - -	\$12.00

FIG. 406.



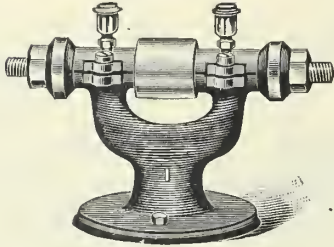
Iron Columns Nos. 2 and 3.

Size of base, - - - - -	No. 2, 16x20	No. 3, 18x22
Size of table, - - - - -	No. 2, 14x18	No. 3, 16x20
Height, - - - - -	No. 2, 30 inches.	No. 3, 24 inches
Weight, - - - - -	No. 2, 125 pounds.	No. 3, 160 pounds
Price, - - - - -	No. 2, \$15.00	No. 3, \$16.00

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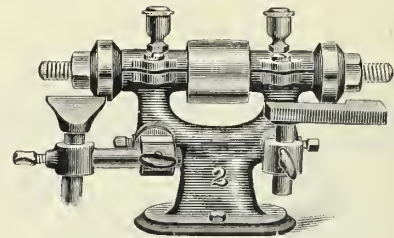
GRINDING HEADS.

FIG. 409.



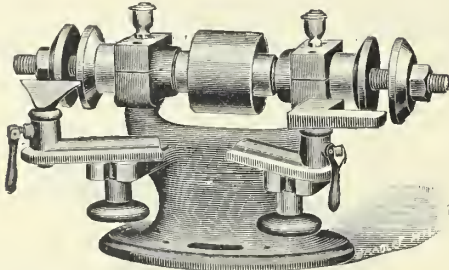
Size of wheels, diameter,	-	-	-	8 inches
Length of steel arbor,	-	-	-	11 inches
Distance between wheels,	-	-	-	7 inches
Size of spindle between collars,	-	-	-	$\frac{5}{8}$ inch
Size of pulley on arbor,	-	-	-	2 x 2 inches
Distance from base to spindle,	-	-	-	5 inches
Price,	-	-	-	\$6.00.

FIG. 410.



Size of wheels, diameter,	-	-	-	8 inches
Length of steel arbor,	-	-	-	11 inches
Distance between wheels,	-	-	-	7 inches
Size of spindle between collars,	-	-	-	$\frac{5}{8}$ inch
Size of pulley on arbor,	-	-	-	2 x 2 inches
Distance from base to spindle,	-	-	-	5 inches
Price,	-	-	-	\$9.00.

FIG. 411.



Nos. 3 and 4.

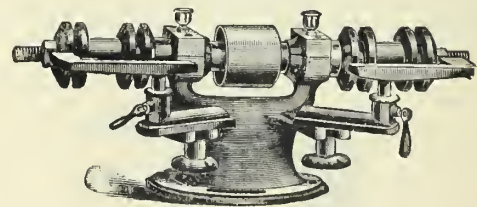
No. 3 GRINDER.

Size of wheels, diameter,	-	-	-	10 inches
Length of steel arbor,	-	-	-	17 $\frac{1}{2}$ inches
Distance between wheels,	-	-	-	11 $\frac{3}{4}$ inches
Size of spindle between collar,	-	-	-	$\frac{7}{8}$ inch
Size of pulley on arbor,	-	-	-	3 x 2 $\frac{3}{4}$ inches
Distance from bench to spindle,	-	-	-	7 inches
Weight, including counter,	-	-	-	115 pounds
Price,	-	-	-	\$12.00.

No. 4 GRINDER.

Size of wheels, diameter,	-	-	-	12 inches
Length of steel arbor,	-	-	-	22 inches
Distance between wheels,	-	-	-	14 $\frac{1}{4}$ inches
Size of spindle between collars,	-	-	-	1 inch
Size of pulley on arbor,	-	-	-	4 x 3 $\frac{3}{4}$ inches
Distance from bench to spindle,	-	-	-	8 $\frac{1}{2}$ inches
Weight, including counter,	-	-	-	145 pounds
Price,	-	-	-	\$18.00.

FIG. 412.



Nos. 3 and 4, for 4 Wheels.

No. 3 GRINDER.

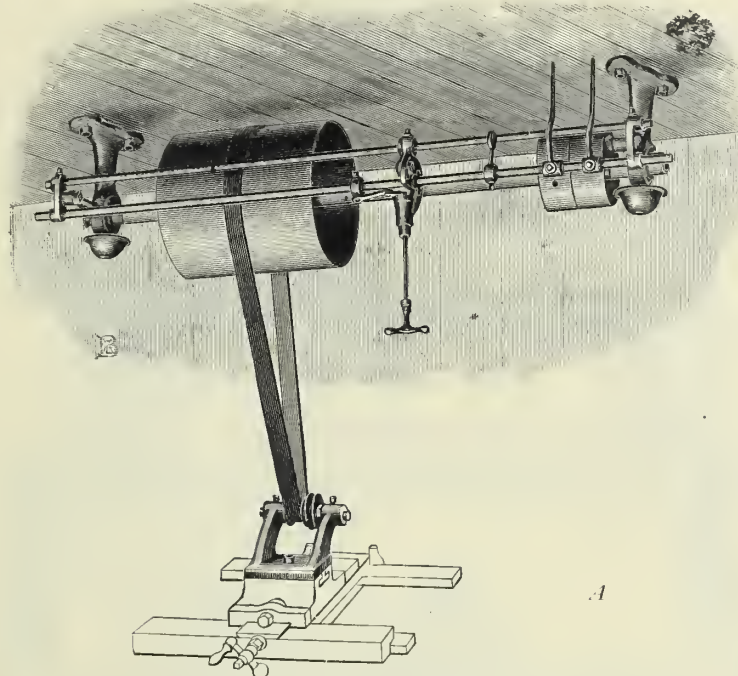
Size of wheels, diameter,	-	-	-	10 inches
Length of steel arbor,	-	-	-	24 inches
Distance between inside of wheels,	-	-	-	11 $\frac{3}{4}$ inches
Size of spindle between collar,	-	-	-	$\frac{7}{8}$ inch
Size of pulley on arbor,	-	-	-	2 x 3 $\frac{3}{4}$ inches
Distance from bench to spindle,	-	-	-	7 inches
Weight, including counter,	-	-	-	128 pounds
Price,	-	-	-	\$15.00.

No. 4 GRINDER.

Size of wheels, diameter,	-	-	-	12 inches
Length of steel arbor,	-	-	-	30 inches
Distance between inside wheels,	-	-	-	14 $\frac{1}{4}$ inches
Size of spindle between collar,	-	-	-	1 inch
Size of pulley on arbor,	-	-	-	4 x 3 $\frac{3}{4}$ inches
Distance from bench to spindle,	-	-	-	8 $\frac{1}{2}$ inches
Weight, including counter,	-	-	-	158 pounds
Price,	-	-	-	\$24.00.

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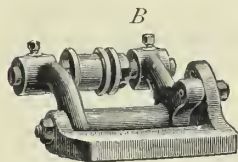
FIG. 413.



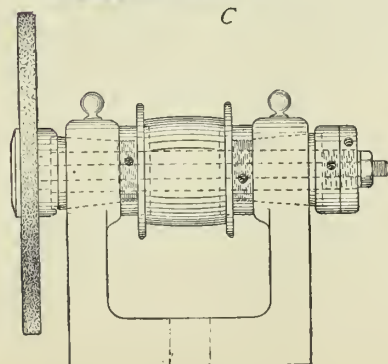
LATHE GRINDING ATTACHMENT.

SHOWN WITH COUNTERSHAFT, DRUM AND PATENT BELT SHIFTER.

THIS arrangement *A* shown above is used attached to any lathe for the purpose of grinding work upon centers. It has the advantage of being economical, and is in quite general use among manufacturers who use a lathe for grinding purposes. It has no adjustment of raise and fall rest, such being obtained by the raise and fall provided to the carriage of lathe upon which it is used. It is in all respects equally as well made as the others. It will swing a wheel 6 inches in diameter. Has hardened steel spindle ground and fitted to bearing. Size of spindle where wheel goes on, $\frac{3}{4}$ inch.



Attachment *B* is provided with an adjustment to raise or lower wheel to the center, upon lathes not provided with elevating or lowering screw to the carriage, as many of the present style gib weight lathes are not arranged to use screws. It can be adjusted to any lathe from 13 inch to 24 inch swing, regardless of any screw to raise or lower the carriage, by making it in two parts, one of which is provided with a slot, making it adjustable to raise or lower as desired. Size of spindle where wheel goes on, $\frac{3}{4}$ inch.



Attachment *C* is provided to use an emery wheel on the outside of boxes. It is made in the best possible manner with hardened steel spindles and split boxes, with every arrangement for end or lateral adjustment. This attachment, with wheel outside of the boxes, has advantages for many different classes and kinds of work over the others. Size of spindle where wheel goes on, $\frac{1}{2}$ inch.

Countershaft has drop of hangers $7\frac{1}{2}$ or 10 inches. Shaft can be made of any length. Has tight and loose pulley, 6 inches diameter, $2\frac{3}{4}$ inch face. Drum 14 inches diameter; 24 inch face, (the face of drum can be extended when so ordered). For a 6 inch wheel the countershaft should run 400 revolutions per minute.

Price of lathe grinding attachment, A, B, or C,	- - - - -	\$25.00
Price of countershaft shown with drum shaft 45 inches long and drum 14x24,	- - - - -	25.00
Extra price for additional length of drum shaft or drum, per foot,	- - - - -	2.00

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FIG. 414.

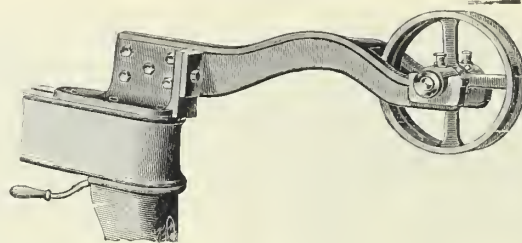
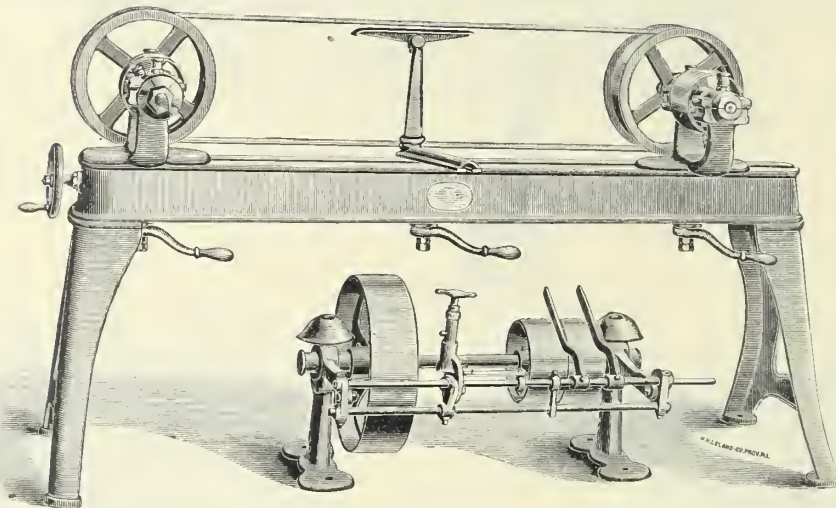


FIG. 415.



BELT STRAPPING MACHINE "D."

THIS machine is built for the purpose of running belts covered with emery, for strapping and polishing. It consists of a rigid bed, planed straight on surface with planed slot, upon which are clamped two heads, each having a steel spindle carrying a driving pulley between the bearings, and a flange pulley close to boxes on the outside. A hand wheel at one end of the bed operates a square thread screw for drawing one of the heads along the bed to secure the proper tension for the belt. To facilitate the changing of belts, the other head is provided with a handle whereby it can be pushed quickly along the bed. Each head is clamped by a lever and cam, shown and a slight movement is sufficient to release or tighten it. One spindle is provided with the regular arrangement for carrying leather-covered or cloth wheels on the end opposite the flange pulley. Two adjustable rests are furnished for different varieties of work, one being used under the lower belt, the other under the upper one.

The machine is heavy, well built, and arranged to run at a high rate of speed. The bearings are of the best Babbitt metal, and only the best material is used throughout. It is arranged to operate quickly, and adapted to all varieties of strapping and polishing work. It can be made of any desired length, with any width of flange pulley up to six inches.

An overhanging head can be furnished to place on the right hand end of machine, which projects about two feet over the bed, allowing the operator to get inside of a cycle or ring, such work of that class which could not be polished in the ordinary machine.

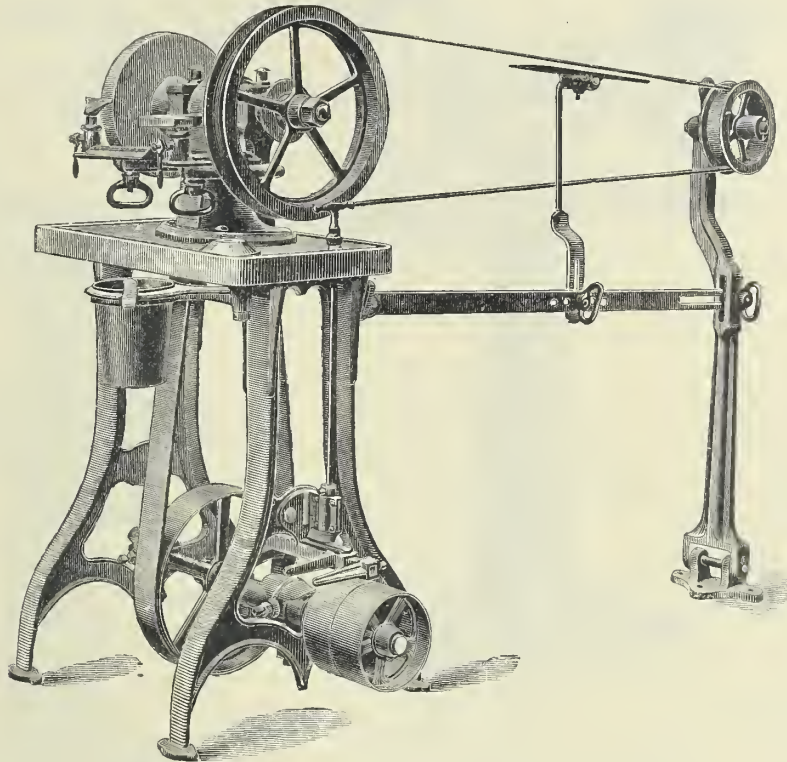
Price, complete, with flange pulleys 14 x 2½ inch face, - - - - \$125.00
Extra for overhanging arm, - - - - - 25.00

DIMENSIONS.

Length of bed, - - - - -	6 feet	Diameter of spindle between flanges, - - -	1¼ inches
Height from floor to center of spindle, - - -	39 inches	Pulley on spindle, - - - - -	6 x 4½ inches
Size of flange pulley furnished, - - - - -	14 x 2½ inches	Floor space, - - - - -	2 x 6 feet
Length of bearings, each, - - - - -	4½ inches	Weight, complete, with countershaft, - - -	700 pounds
Diameter of spindle in bearings, - - - - -	1⅜ inches		

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FIG. 416.



No. 4 MACHINE MOUNTED ON FRAME.

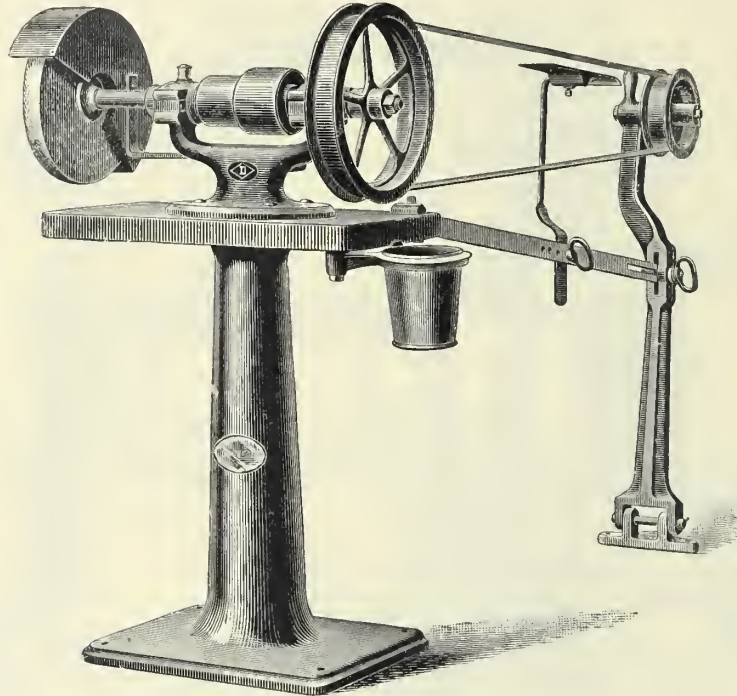
DRIVING SHAFT UNDER. WITH BELT STRAPPING ATTACHMENT "A."

THE above illustration shows an attachment applied to our regular No. 4 Machine, whereby the polishing is done by means of an endless belt. It is practically adapted to all kinds and shapes of articles in hardware, and other metals where the ordinary polishing wheel cannot be used. The flanged pulley can be readily removed from the machine, and an ordinary polishing or solid wheel used in its place. The belt strapping attachment can be supplied to use upon any machine that will run wheels 12 inches in diameter. We make eight widths flange pulleys, running belts up to 6 inches wide. The one to use 2 inch belt will be sent unless otherwise ordered. The countershaft used with this machine, where the driving shaft shown is not required, is our No. 1 Regular; has tight and loose pulley, 6 inches in diameter, $2\frac{3}{4}$ inch face; driving pulley, 12 inches in diameter, 3 inch face. For the machine shown, countershaft should run 400 revolutions per minute; this will give to the speed of spindle 1200 turns.

Price, with 2 inch flange pulleys, 12 and 6 (without belt),	- - - - -	\$85.00
Price of No. 4 grinding machine (head),	- - - - -	28.00
Price of iron frame, with water pot,	- - - - -	17.00
Price of driving shaft under, or patent countershaft overhead, single driving pulley,	- - - - -	15.00
Price of belt strapping attachment "A," without belt,	- - - - -	25.00

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FIG. 417.



BUFFING LATHE ON COLUMN,

AND BELT STRAPPING ATTACHMENT "A" COMBINED.

THE head shown on column stands $7\frac{1}{2}$ inches from base to center of spindle. It can be furnished with single or cone pulley on spindle. Diameter of spindle between flanges is 1 inch (unless otherwise ordered), in the bearings, $1\frac{1}{4}$ inches, the length of which will be made 36 inches unless otherwise ordered. The strap polishing attachment can be removed and buff or solid wheels used on both ends if desired. This arrangement has the advantage of being quickly placed in position, and as readily removed. When changes of belts are required, it can be done almost instantly, by slacking up the jointed standard, one end of which is firmly attached to the floor. Flanged pulleys are furnished from $1\frac{1}{2}$ to 6 inches wide, 12 and 6 inches diameter, with $\frac{3}{4}$, 1 and $1\frac{1}{4}$ inch hole; they are turned and balanced to run perfectly true. Price given for strapping attachment (\$25.00) includes two flange pulleys 12 and 6 inches diameter, $2\frac{1}{2}$ inch face and 1 inch hole, unless otherwise ordered.

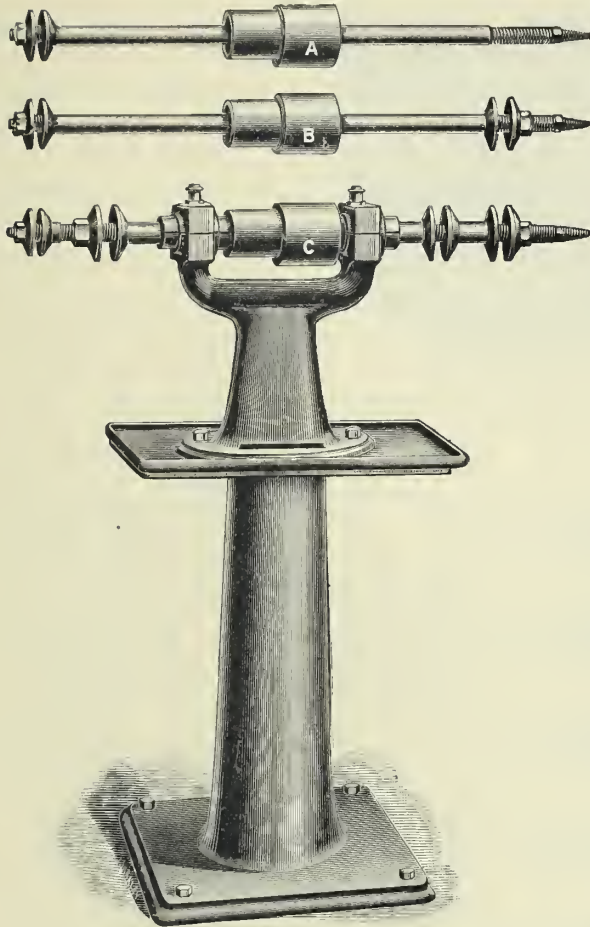
Cone pulley on spindle is $3\frac{1}{2}$ - $4\frac{1}{2}$ inches diameter, $\frac{3}{4}$ inch face. Countershaft has tight and loose pulley 6 inches diameter, $\frac{3}{4}$ inch face. Cone pulley 11-12 inches diameter, $\frac{3}{4}$ inch face.

The countershaft on this machine should run 430 revolutions per minute; this will give to the slowest speed 1050 revolutions; to the quickest speed, 1440 revolutions per minute.

Price, complete, with flange pulleys, 12 and 6 x $2\frac{1}{2}$,	- - - - -	\$65.00
Price of buffing head, shown with A spindle and single pulley,	- - - - -	17.50
Price of buffing head, shown with D spindle and tight and loose pulley,	- - - - -	20.00
Price of buffing head, shown with G spindle and cone pulley,	- - - - -	22.50
Price of hood shown,	- - - - -	2.50
Price of iron column for buffing head,	- - - - -	15.00
Price of strap polishing attachment "A" shown,	- - - - -	25.00
Price of countershaft with single pulley,	- - - - -	15.00
Price of countershaft with cone pulley,	- - - - -	17.00

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FIG. 418.



POLISHING AND BUFFING MACHINES.

PRICES.

Number,	-	-	-	-	-	3	5
Bench machine spindle A.	If B, add \$2.00; if						
C, add \$4.00; if single pulley, deduct \$1.50.						\$22.00	\$30.00
Plain column,	-	-	-	-	-	34.00	45.00
Counter,	-	-	-	-	-	12.00	15.00

DIMENSIONS.

Number	-	-	-	-	3	5
Bearings,	-	-	-	-	4 1/4 x 1 1/4 ins.	5 x 1 1/2 ins.
Pulley on spindle,	-	-	3 and 4	x 3 1/2 ins.	4 & 5 1/2 x 4 1/2 ins.	
Driving pulley on counter,	-	-	12 & 11	x 3 1/4 ins.	9 1/2 & 11 x 4 ins.	
T. & L. pulley on counter,	-	-	6 x 3 1/4 ins.		7 x 4 ins.	
Weight head,	-	-	75 pounds		120 pounds	
Weight counter,	-	-	50 pounds		110 pounds	
Weight plain counter,	-	-	140 pounds		225 pounds	
Height bench machine to center spindle,	-	-	-	-	12 feet	15 feet
Spindle. Last figure denotes hole in wheel,	-	-	36 x 1 1/4 ins.		40 x 1 1/2 ins.	
Weight counter,	-	-	75 pounds		110 pounds	
Weight head,	-	-	60 pounds		105 pounds	
Weight on column,	-	-	150 pounds		240 pounds	

SQUARE HEAD AND COLUMN.

PRICES.

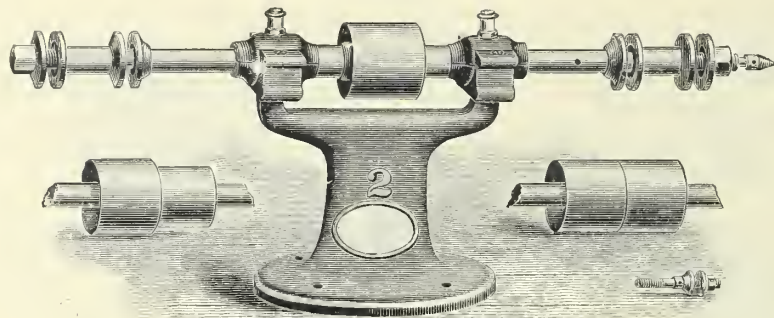
Number,	-	-	-	-	-	B	C	D
Bench machine with spindle B.	If spindle C, add \$2.00,					\$14.00	\$24.00	\$34.00
Counter,	-	-	-	-	-	10.00	12.00	15.00
Plain base to belt to overhead counter,	-	-	-	-	-	24.00	36.00	49.00
Counter base to belt to main shaft,	-	-	-	-	-	39.00	54.00	69.00

DIMENSIONS.

Number,	-	-	-	-	-	B	C	D
Bearings,	-	-	-	-	-	3 x 1 inches	4 x 1 1/8 inches	5 x 1 3/8 inches
Pulley on spindle,	-	-	-	-	-	2 3/4 x 2 3/4 inches	3 1/2 x 3 1/4 inches	4 x 4 inches
Driving pulley on counter,	-	-	-	-	-	9 x 2 1/4 inches	12 x 3 1/4 inches	12 x 3 1/4 inches
T. & L. pulley on counter,	-	-	-	-	-	5 x 2 1/2 inches	6 x 3 1/4 inches	6 x 3 1/4 inches
Height bench machine to center spindle,	-	-	-	-	-	8 feet	9 feet	10 feet
Spindle. Last figure denotes hole in wheel,	-	-	-	-	-	24 x 3/4 inches	34 x 1 inches	36 x 1 1/4 inches
Weight head,	-	-	-	-	-	40 pounds	50 pounds	75 pounds
Weight on plain base,	-	-	-	-	-	170 pounds	215 pounds	290 pounds
Weight on counter base,	-	-	-	-	-	220 pounds	275 pounds	350 pounds
Weight counter,	-	-	-	-	-	45 pounds	60 pounds	65 pounds

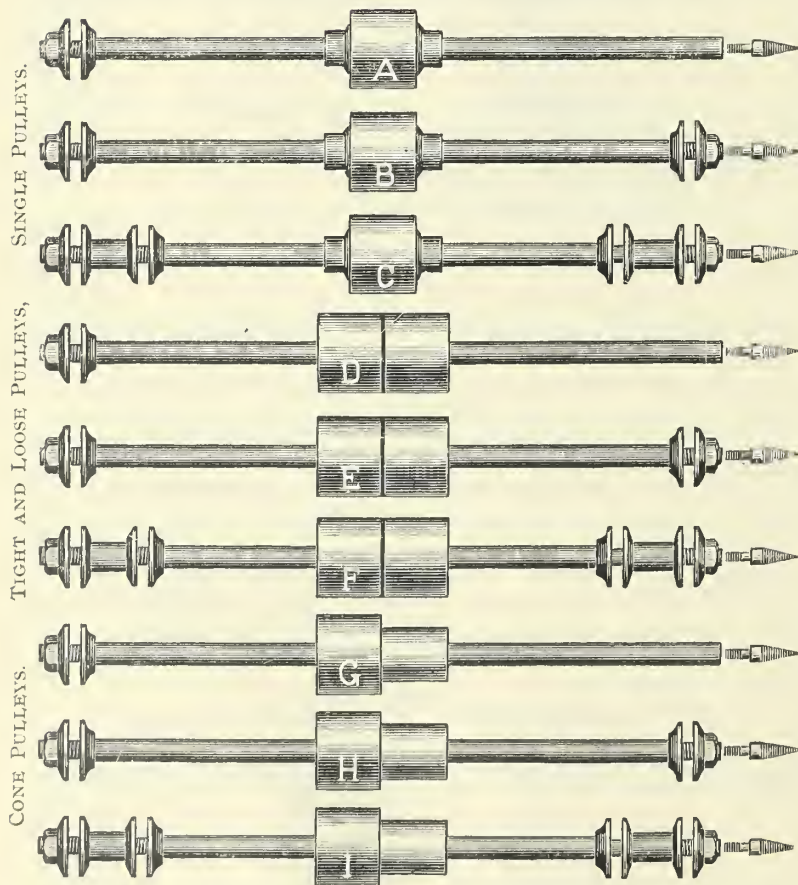
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FIG. 420.



No. 2 POLISHING OR BUFFING LATHE.

FIG. 421.



Prices with No. 2 head, cast iron boxes, including one taper attachment.
 A \$20.00 single pulley. D \$22.50 tight and loose pulley. G \$25.00 cone pulley.
 B 22.00 single pulley. E 25.00 tight and loose pulley. H 27.00 cone pulley.
 C 25.00 single pulley. F 27.50 tight and loose pulley. I 30.00 cone pulley.

Prices with No. 2 head, Babbitt boxes, including one taper attachment.
 A \$17.50 single pulley. D \$20.00 tight and loose pulley. G \$22.50 cone pulley.
 B 20.00 single pulley. E 22.50 tight and loose pulley. H 25.00 cone pulley.
 C 22.50 single pulley. F 25.00 tight and loose pulley. I 27.50 cone pulley.

IRON COLUMN WITH IRON TABLE.

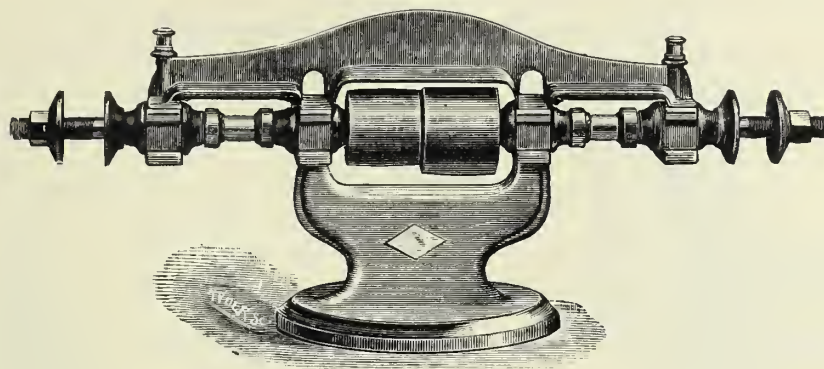
USED FOR MOUNTING No. 2 POLISHING OR BUFFING LATHE.

Price of iron column shown, - - - - - \$15.00
 The column stands 34 inches from base to top; size of iron table is 25x14; weight of column, 160 pounds. Our machines are fitted to this column, when ordered.
 Price of patent countershaft with tight and loose and single driving pulley. - - \$15.00
 Price of patent countershaft with tight and loose and cone pulley, - - - 17.50

STEEL SPINDLES USED IN POLISHING OR BUFFING HEADS No. 2.

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FIG. 422.



No. 3 POLISHING OR BUFFING LATHE.

WITH OVERHANGING ARM.

A \$45.00, single pulley.	D \$50.00, tight and loose pulley.	G \$52.50, cone pulley.
B 50.00, single pulley.	E 55.00, tight and loose pulley.	H 57.50, cone pulley.
C 55.00, single pulley.	F 60.00, tight and loose pulley.	I 62.50, cone pulley.

Cast-iron boxes (4 sets) are made in halves and set into the frame of the head, as in an engine lathe. They have patent dust-excluding device attached. Hardened steel cap screws used.

It can be furnished with single, tight and loose, or cone pulley. This Polishing Lathe can be supplied with any of the styles of spindles shown. It is designed for a first-class machine in every respect, on any polishing or buffing work requiring stiffness, strength and durability.

DIMENSIONS OF LATHE.

Size of base,	- - - - -	17 x 11 inches
Height from base to center of spindle,	- - - - -	12 inches
Diameter of spindle in boxes,	- - - - -	1 ½ inches
Diameter of spindle between flanges,	- - - - -	1 ¼ inches
Length of spindle,	- - - - -	52 inches
Size of single pulley,	- - - - -	6 x 6 inches
Size of cone pulley,	- - - - -	5 x 6 x 4 ½ inches
Length of bearings,	- - - - -	10 inches
Weight,	- - - - -	200 pounds

DIMENSIONS OF COLUMN.

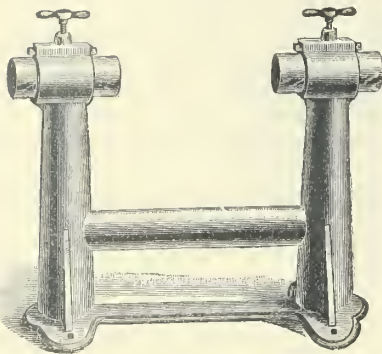
Weight of column on which No. 3 machine is placed,	- - - - -	175 pounds
Height from floor to top of iron table,	- - - - -	24 inches
Dimensions of top of column,	- - - - -	16 ½ x 10 inches
Dimensions of base of column,	- - - - -	20 x 24 inches
Weight of machine and column shown,	- - - - -	375 pounds

Price of No. 3 Polishing Machine (head) spindle "H" shown,	- - - - -	\$57.50
Price of column (only) for No. 3 or 4 polishing heads,	- - - - -	16.00
Price of countershaft, tight and loose and cone pulley, with patent belt shifter,	- - - - -	18.00
Price of countershaft, without patent belt shifter,	- - - - -	16.00

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CUPOLA POLISHING FRAME, No. 1.

FIG. 423.



This Frame, for wooden polishing wheels, stands from floor to center of pulley 27 inches; takes arbor on centers to 14½ inches long, and wheels up to 24 inches in diameter.

Weight,	-	-	-	-	-	-	-	-	150 pounds
Height from cross-bar to center of spindle,	-	-	-	-	-	-	-	-	12 inches
Price,	-	-	-	-	-	-	-	-	\$17.00

No. 2.

Distance from floor to center of pulley,	-	-	-	-	-	-	-	-	34 inches
Takes wheels up to	-	-	-	-	-	-	-	-	32 inches
Weight,	-	-	-	-	-	-	-	-	350 pounds
Height from cross-bar to center of spindle,	-	-	-	-	-	-	-	-	17 inches
Price without arbors,	-	-	-	-	-	-	-	-	\$35.00
Price with arbors,	-	-	-	-	-	-	-	-	42.50

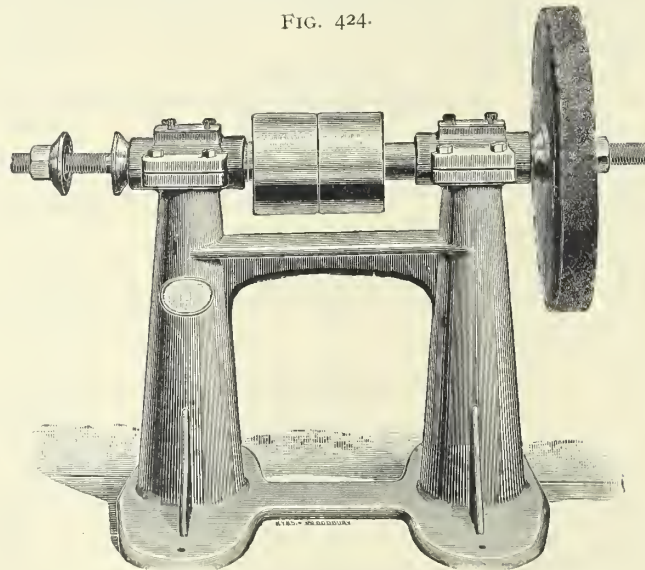
We also make steel arbors for wooden wheels of all sizes to order. Special spindles to order.



STEEL SPINDLE FOR CUPOLA FRAME.

Steel spindles with steel taper ends solid to arbor,	-	-	-	-	-	-	-	-	\$5.00
Steel spindles made with steel taper ends into each end of spindle, removable and hardened, or flanges and nut,	-	-	-	-	-	-	-	-	8.00

FIG. 424.



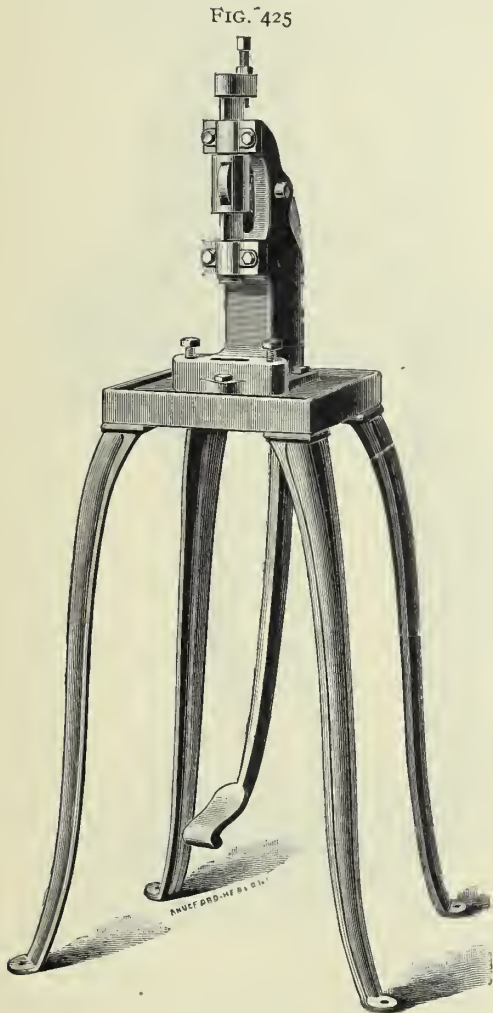
DOUBLE COLUMN POLISHING LATHE, No. 1.

This Lathe is unequaled by anything in the market for running wood or leather wheels or large muslin buffs at a high speed. Unlike the old style "single upright" lathes, there is no vibration.

Height, 22 inches to spindle; steel spindle, 38 inches long, 1¼ inches diameter between flanges; bearings, 7 inches long; tight and loose pulleys, each 6 x 4½; weight, 209 pounds.

Price, with tight and loose pulley, 6 x 4½,	-	-	-	-	-	-	-	-	\$30.00
Price, with single pulley, 6 x 4½,	-	-	-	-	-	-	-	-	25.00

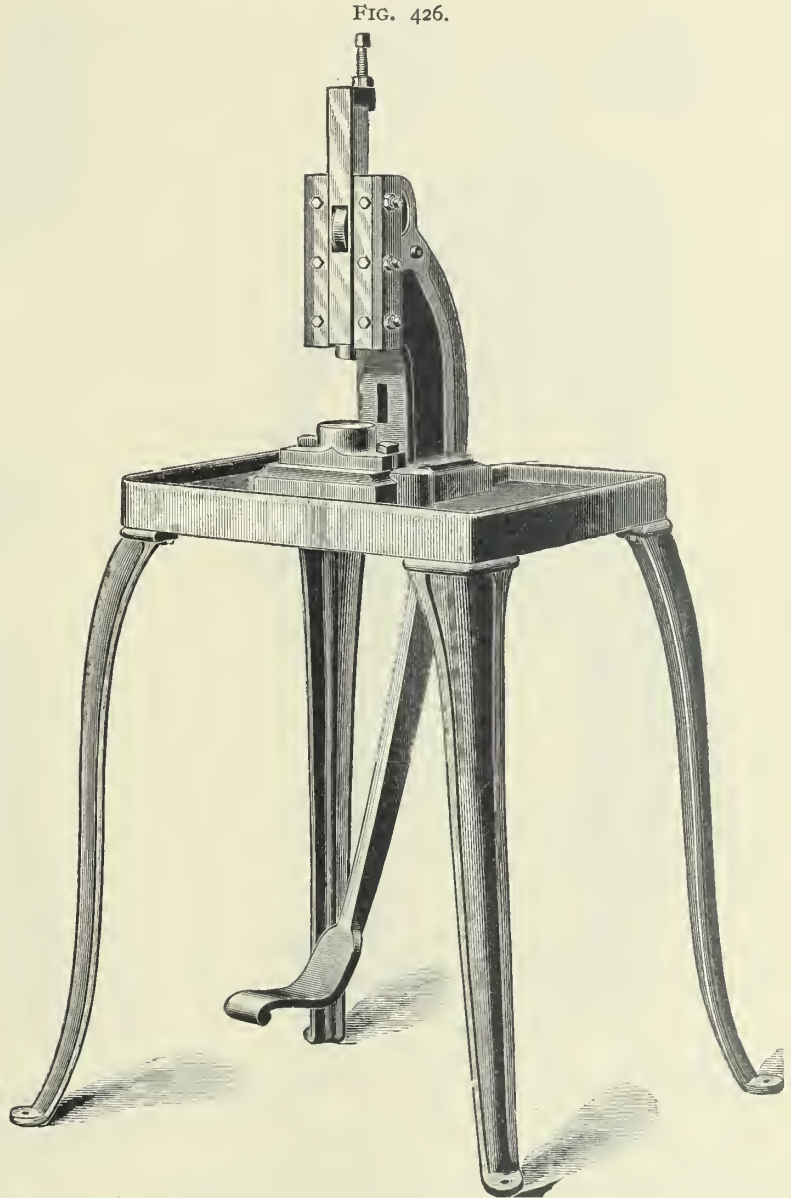
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No. 1 SQUARE SLIDE FOOT PRESS.

Stroke, $1\frac{1}{2}$ inches; distance from bed to bottom of guide, $4\frac{1}{2}$ inches; from bed to bottom of slide when down, $2\frac{1}{2}$ inches; from center of slide to upright, $2\frac{1}{2}$ inches; size of bed, 7×5 inches; opening through bed, $2\frac{1}{2}$ inches diameter; distance between die-bed bolts, 5 inches.

Weight,	-	-	-	-	-	200 pounds
Price,	-	-	-	-	-	\$
Price without table,	-	-	-	-	-	



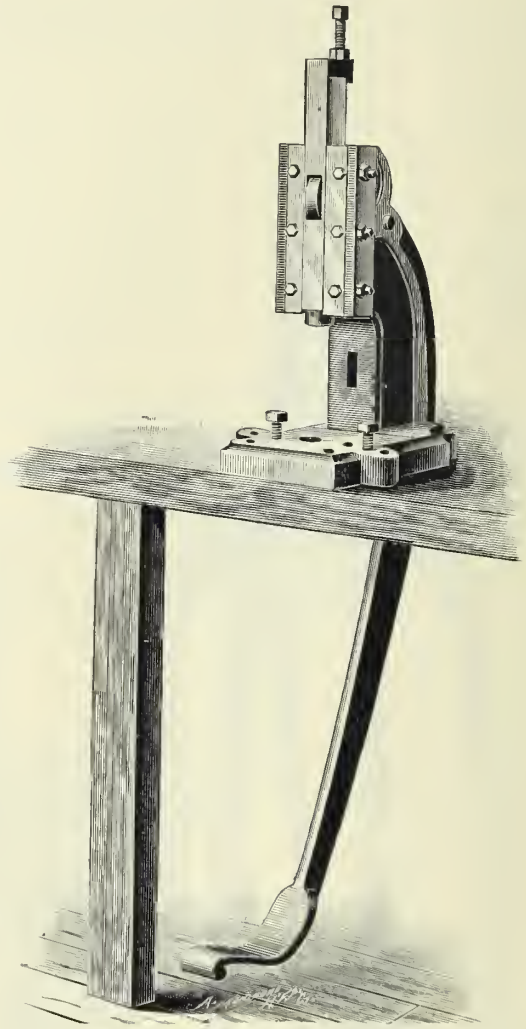
No. 2 FOOT PRESS WITH GIBBED SLIDE, ON TABLE.

Stroke, $1\frac{3}{4}$ inches. Other dimensions same as on previous page. The table is 24×30 inches, and 36 inches high; iron drawer fitted when desired. Price does not include die bed shown in the above cut.

Weight,	-	-	-	-	-	300 pounds
Price,	-	-	-	-	-	\$

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FIG. 428.



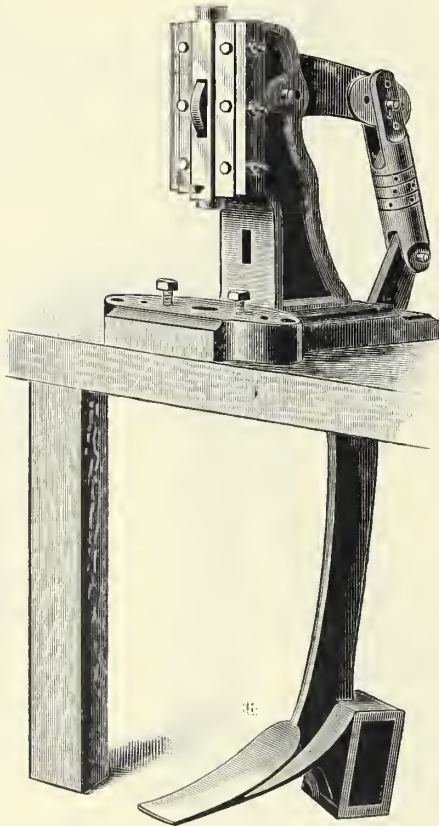
FOOT PRESS WITH IRON KICK-TREADLE.

No. 2.

This cut shows the size and kind of foot press in most general use among the manufacturers of brass goods; specifications are as follows: Stroke, $1\frac{3}{4}$ inches; distance from bed to bottom of guides, 6 inches; distance from bed to bottom of slide when down, $2\frac{3}{4}$ inches; from center of slide to upright, 3 inches; distance between die-bed bolts, $5\frac{1}{2}$ inches or $7\frac{1}{2}$ inches; opening in bed, 2 inches diameter.

Weight, - - - - - 130 pounds
Price, - - - - - \$

FIG. 427.



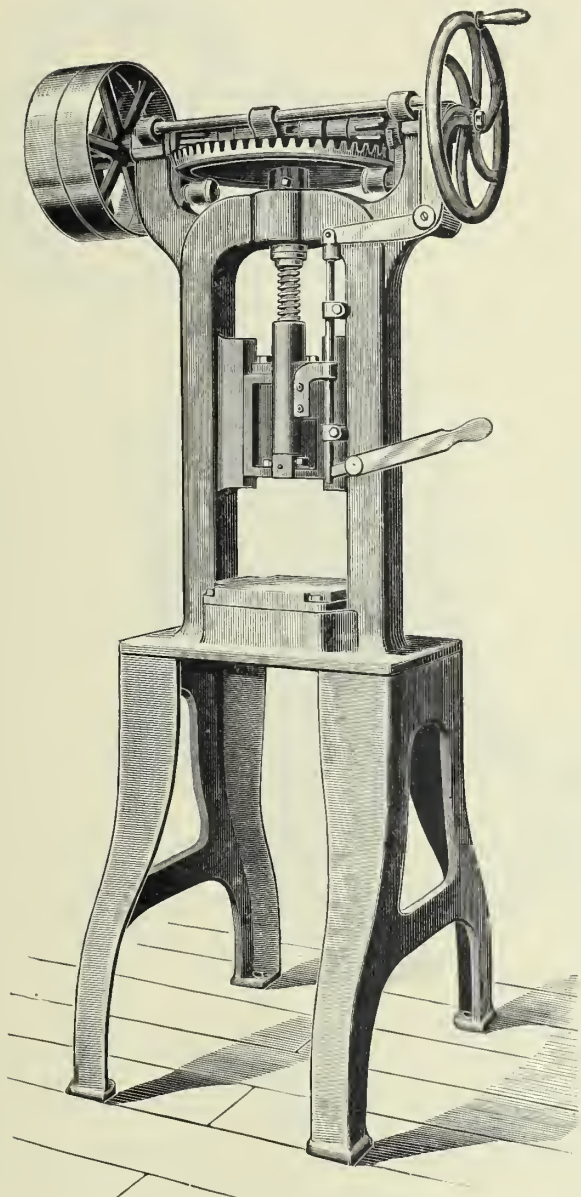
WEIGHTED COMPOUND LEVER FOOT PRESS.

Stroke, 1 inch; distance from bed to bottom of guides, $6\frac{1}{8}$ inches; from bed to bottom of slide when down, 5 inches; from center of slide to uprights, 3 inches; distance between die-bed bolts, $5\frac{1}{2}$ or $7\frac{1}{2}$ inches; size of bed, 13 x 6 inches; opening in bed, $2\frac{1}{4}$ inches diameter.

Weight, - - - - - 290 pounds
Price, - - - - - \$

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FIG. 429.

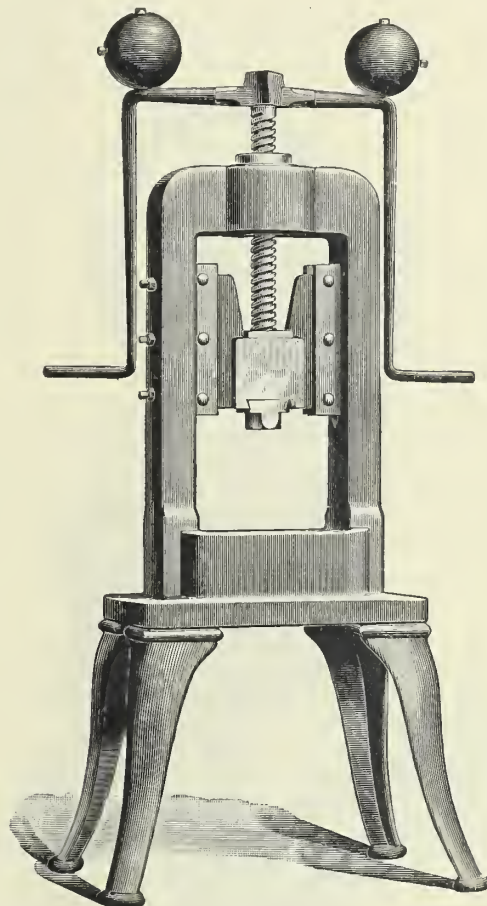


POWER SCREW PRESS.

DESCRIPTION FIG. NO. 430.

This Press has been especially designed to supply a first-class screw press for tool room use in testing new dies, and is also largely used by bicycle manufacturers. The stroke of slide is $4\frac{1}{2}$ inches; the distance from bottom of guides to bed, 11 inches; distance between uprights, 15 inches; the bed is 10 inches wide, with opening 3 inches in diameter, or as desired; diameter of steel screw, $2\frac{1}{2}$ inches; double thread with $1\frac{1}{2}$ inches pitch. Weight, 1750 pounds.

FIG. 430.



ARCH SCREW PRESS.

FOR BICYCLE, SEWING MACHINE, GUN AND OTHER SPECIAL WORK.

DESCRIPTION FIG. NO. 429.

This Press is a convenient and cheap tool for a great variety of operations in bicycle, sewing machine, gun and other factories.

It can be used for broaching and sizing of holes, bending and forming, also for reducing sheet metal, shells, etc.

The uniformity of speed and the adjustment of the stroke, make it a more preferable tool in many cases than a long stroke crank press. The machine, as shown, is stopped and reversed by a jaw coupling. It will reverse automatically on the down stroke and stop on the up stroke. The stroke can be adjusted by dogs on the shifter rod. This rod can be continued to the floor and operated by the foot. In place of the jaw coupling, a double friction clutch has been used to advantage. Changes can be made to suit requirements, and larger and smaller sizes will be built.

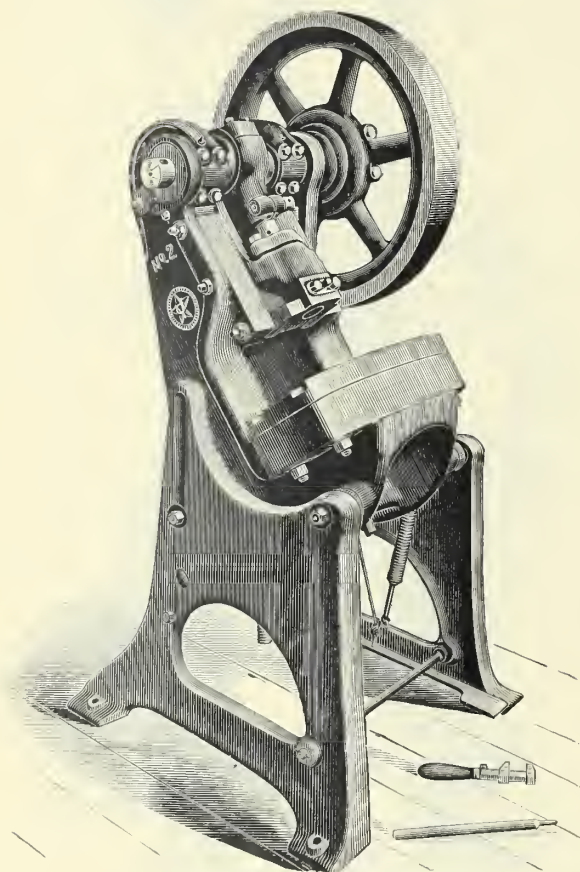
SPECIFICATIONS.

Largest stroke,	-	-	-	-	-	6 inches
Space between uprights,	-	-	-	-	-	12 inches
Space from bed to bottom of slide, down stroke,	-	-	-	-	-	$7\frac{1}{2}$ inches
Ratio of gearing,	-	-	-	-	-	$4\frac{1}{2}$ inches
Diameter of screw,	-	-	-	-	-	2 inches

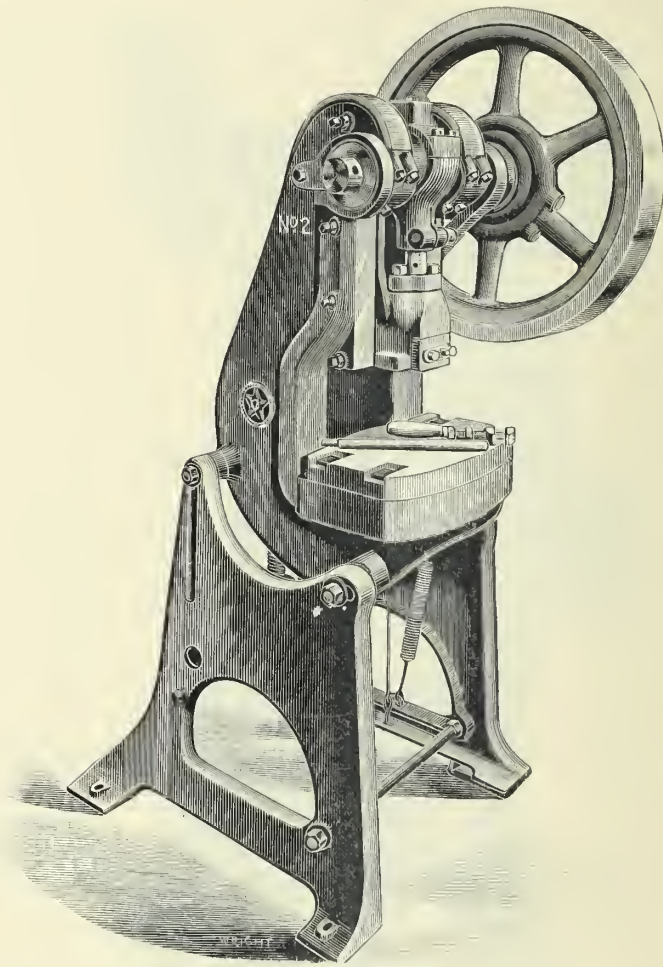
PRENTISS TOOL & SUPPLY CO.

FIG. 432.

FIG. 431.



INCLINED POSITION.



UPRIGHT POSITION.

No. 2 POWER PRESS.

THE following are the chief features embodied in this improved line of Power Presses :

A new clutch of the simplest and most effective description, working in a solid enlarged shaft and engaging centrally in the hub of the fly wheel, throwing the resistance on the neutral axis of the revolving weight of the fly wheel, insuring equal distribution of the strain through the full length of the wheel bearing, can be removed, reversed or replaced without removing wheel or disturbing bearing ; by touching a thumb piece clutch can be locked, enabling the shaft to be revolved in any position, while setting dies, without danger of press starting even when fly wheel is running.

The switch plate is enclosed in a housing which can be adjusted to trip as early or late as desired, thus adapting press to a great variety of speeds and to great variation of load on shaft, such as cams, gears, cranks, etc. This plate, after releasing wheel, passes up into a depression in shaft, forming a positive stop.

The center rises little, if any, higher in the inclined position, than when in the upright, thus making it convenient for the operator when press is in either of the positions. It is raised and lowered by a self-supporting ratchet device.

An unusually long and wide bearing slide. A long slide adjustment with a powerful grip for locking pitman stem by a slight motion of a hand bar. A positive knockout for punches taking place of springs.

One bolster, four bolts, one hand bar, one Coe monkey wrench, and four floor bolts are provided gratis with each press.

SPECIFICATIONS.

No. of Press,	0	1	2	3	4
Diameter of wheel,	18	22	28	34	42
Face of wheel,	2 3/4	3 1/2	3 1/2	4	5
Opening through back and bed,	5	7	8	11	18
Distance back of die center to check,	4	4 1/2	4 3/4	7	11
Strike as desired, from	0 to 1 1/2	0 to 2	0 to 2 1/2	0 to 3	0 to 3 1/2
Weight of wheel,	85	175	280	550	900
Weight of press, complete,	400	900	1400	2200	4200



FOOT AND POWER PRESSES

FOR ALL KINDS OF SHEET AND BAR METAL WORK, ARE DESCRIBED ON THE NEXT 20 PAGES.

THEY ARE CLASSIFIED AS FOLLOWS:

- Class C**, Cutting, horning and wiring presses—power, inclinable or fixed.
- Class D**, Drawing and deepening presses—power, single or double action.
- Class E**, Embossing and coining presses—power, toggle or otherwise.
- Class F**, Foot and hand presses—lever, pendulum, screw, etc., single or double action.
- Class G**, Gravity presses, drops—with hand, foot, crank, belt or roller-lifters.
- Class P**, Punching and shearing presses—power, throated.
- Class S**, Stamping and bending presses—power, double crank, composite fraue, throated or straight, upright or inclined, rectangular or round beds.

Non-geared presses are commercially named with their "type-word" "press," followed by their "symbol," consisting of their "class-letter" prefixed to a "size-number," as "press C₁," "press D₃," etc. All geared presses have a "gear-letter," "G," after "class-letter." Thus, "press P₅," when gearing is added, becomes "press PG₅," and the "symbol-plate," attached to frame of press is changed accordingly.

KIND OF WORK.—They are adapted for almost every kind of work in cutting, forming, punching, pressing, embossing, coining, drawing, deepening, etc., etc., and for the production of an immense variety of articles among the manufacturers of tinware, paint pails, coal hods, druggists' tinware, petroleum and other oil cans, meat, fruit, vegetable and fish cans, oil stoves, elevator buckets, cornice work, drip pans, vapor stoves, roofing, speaking tubes, gas fixtures, cuspidores, clocks, silver ware, plated ware, lamps, lanterns, bird cages, tobacco boxes, stencils, electrical discs and hardware, brass goods, shovels, hinges, agricultural implements, locks, kitchen boilers, cutlery, watches, satchel frames, musical instruments, buckles, pen holders, jewelry, pocket books, playing cards, trunk trimmings, toys, porous plasters, albums, etc., etc.; also for other metal, paper, cloth and leather goods, etc.

QUALITY, ETC.—All of these presses are of recent design, are built in the same style as first-class machine tools, and are adapted for long, hard service. They are fitted up with carefully scraped working surfaces, steel shafts, steel pitmans, hardened steel clutches, milled and case-hardened adjusting bolts and nuts, and drop forged wrenches. All gear teeth are accurately cut from the solid metal, and the geared presses are furnished with loose pulleys. Among many other valuable features will be found:

An unusually great height from bed up to ram, so that all sorts of high dies can be used when ram is adjusted up. A long ram adjustment, usually 3 inches or more, with a powerful grip for securing adjustment. Usually strong and heavy rams, with very long and wide slide-bearings, and with a large recess in lower ends in which bushings of various kinds can be inserted for all descriptions of punch-shanks, whether screwed, cylindrical, tapering, octagonal, square, etc., and up to a size of 2 inches to 3 inches square by 3 inches high. A new clutch, of the simplest description, working in a solid enlargement of the shaft, with no nuts or screws to become loose—the whole device being taken apart in less than a minute after sliding out the fly-wheel. A safety-lock for clutch, quickly operated, which enables the shaft to be revolved to any position in setting dies, etc., without danger of press starting, even when fly-wheel is running, also an improved arrangement for oiling fly-wheel, etc., while running. A clutch, tripping device, which is adjustable through a large arc, about axis of shaft, and which is graduated to be set to trip as early or late as desired, thus adapting press not only to a great variety of speeds, but to a considerable variation of load upon shaft, such as cams, pulleys, gears, cranks, etc.,—also to various amounts of tightness in gib and other joints, all this being obtained with but very slight brake pressure. A simple durable spring brake, surrounding and partly supporting the shaft at the end where the fly-wheel would, by its weight, naturally wear down most the journal-box nearest it, yet set with so light a pinching pressure as not to waste the power that is squandered with ordinary clutches. A treadle-lock, by which treadle can be locked down for continuous running, or up, to guard against accidental starting. Last, but not least, a very massive and handsome design, with the metal placed where it will do the most good, with heavily rounded corners, graceful, harmonious curves, and an entire absence of the external ribs, brackets' etc., which disfigure so many designs of otherwise good machinery. All necessary adjusting cranks, wrenches, bed-bolts and floor-bolts, as shown on the floor in the cuts, are provided gratis, with each press. A bushing for ram and a bolster are provided (at extra expense) if desired. This bushing is usually tapped to 1 inch U. S. Standard, 8 threads per inch and 2 inches deep. The bolster is usually provided with four tee-slots, in which are "tail-clamps" for gripping die-plates—also with $\frac{3}{4}$ inch tapped holes 7, 10, 13 inches, etc., apart, in which are tap-bolts for use with drilled die-plates. Unless stated to the contrary, all press-beds (where bolster lies) are 32 inches above floor.

Presses ordered by symbol (as, "send press PG 4") will be equipped as above and charged at what, in most of the tables, is "second price," that is with bolster and bushing. If bolster and bushing are not wanted, the order should specify "first price," etc.

Any other size of central hole through bolster, as specified in bolster-tables, may be substituted for standard size mentioned in press-tables, without extra charge, as also may a solid bolster with no hole at all.



A LINE OF CUTTING ("C") PRESSES ARE SHOWN ON NEXT TWO PAGES.

THE SPECIAL ADVANTAGES IN THESE ARE AS FOLLOWS :

First.—A center of oscillation for frame so far forward that the center of the dies rises but little, if any, higher in the inclined position than in the upright, thus avoiding the necessity of the operator standing upon a platform to handle the work when press is inclined, as is often the case with other makes.

Second.—A self-supporting device by which any inclination can be quickly obtained by slightly loosening leg-nuts and revolving crank of elevating screw, which is geared on the large sizes.

Third.—An unusually great height from bed up to ram, so that all sorts of high dies can be used, when ram is adjusted up.

Fourth.—A long ram adjustment of 3 inches, with a powerful grip for locking pitman-stem by a slight motion of a wrench upon a single bolt, without moving any lock-nuts.

Fifth.—An unusually strong and heavy ram, with very long and wide slide-bearings, and with a large recess in its lower end, in which bushings of various kinds can be inserted for all possible descriptions of punch-shanks, whether screwed, cylindrical, tapering, octagonal, square, etc., and up to a size of 3 inches high by 2 inches to 3 inches square ; also with flanges and bolts for fastening on large flat upper dies, without shanks.

Wrenches, floor-bolts, elevating crank, etc., shown on the floor, are furnished with the press. Bolster is provided with four sliding steel clamps, which will grip die-plates of any size or shape within their capacity, and also with tap bolts to screw into the tapped holes shown. These bolsters all have 4 inch round holes through them, unless otherwise ordered, and are secured to press by the four bed-bolts shown in bed. A ram bushing is also furnished if ordered.

VARIATIONS, TO ORDER.

Bed may have front cut out so as to be open from hole forward ; or, bed-hole may be cast smaller or filled up solid. Stroke may be any number of quarter-inches to as great an amount as practical. Bolster may be varied in thickness and size and shape of hole. Bushing may be varied in height and in kind, and size of hole. Bolsters may be omitted and also the elevating apparatus if not wanted.

Three sets of prices are given in table below, and presses may be ordered complete as shown, or at lower prices, omitting the bolster and bushing, and also the "elevator."

The "elevator" consists of two swinging cross-beams and a supporting screw, placed between the legs and operated by a crank (geared on the larger presses), and is used when changing the press-frame from "upright" to "inclined," or vice versa. When elevator is omitted, supporting blocks are provided to go in the curved slots. "Second" prices are also for presses with bolster, etc., but without elevators.

PRICES, DIMENSIONS, ETC., TABLE C O.

Nominal size, - - - - -	Press	C 1	C 2	C 3	C 4	C 5	C 6
Price without elevator and bolster, &c. - - - - -	\$	130	170	240	340	510	850
Price with elevator, but without bolster, &c. - - - - -	\$	140	180	255	365	545	900
Price with elevator and bolster, &c., complete, - - - - -	\$	150	190	270	390	580	950
Weight complete about - - - - -	pounds	900	1400	2100	3400	5300	8300
Hole through bed—rectangular, - - - - -	inches	4x6	6x8	8x10	10x14	14x20	20x28
Hole through bed—circular part, - - - - -	inches	6	8	10	14	20	28
Hole through back—width, - - - - -	inches	9½	11	12½	15	18½	22½
Throat, from center of ram back, - - - - -	inches	5	6	7	9	12	16
Height bed to ram—when up, - - - - -	inches	9	9½	10	10½	11	11½
Stroke of ram, - - - - -	inches	2	2	2	2	2	2
Adjustment of ram—downward, - - - - -	inches	3	3	3	3	3	3
Diameter of fly-wheel, - - - - -	inches	20	25	30	35	40	45
Width of fly-wheel, - - - - -	inches	3	4	5	6	7	8
Weight of fly-wheel—about, - - - - -	pounds	175	275	475	750	1100	1500
Speed, per minute—about, - - - - -	revolutions	130	120	110	100	90	80
Thickness of bolster, - - - - -	inches	1½	2	2½	3	3½	4
Size of round hole in bolster, - - - - -	inches	4	4	4	4	4	4
Pressure exerted by ram about, - - - - -	tons	7	12	24	38	52	68
Extreme height—floor to top of wheel, - - - - -	inches	66	70½	75	79½	84	88½
Extreme depth—front to back, - - - - -	inches	28	34½	41	48½	57	66½
Extreme width—right to left, - - - - -	inches	31	33	38	43	50½	60

NOTE.—The "&c." above refers to bolster clamps and ram bushing.

BENCH (C) PRESSES, SAME GENERAL STYLE TABLE C 100.

Nominal size, - - - - -	press	C 101	C 102
Price—without bolster and bushing, - - - - -	\$	120	160
Price—with bolster and bushing, - - - - -	\$	130	170
Weight—about, - - - - -	pounds	850	1300
Height—bench to bed, - - - - -	inches	14	14
Other dimensions, - - - - -		as in table C O	

All of these C presses are standard, and are built a number at a time on the duplicate system, and the smaller sizes are kept in stock, and so can be shipped promptly.

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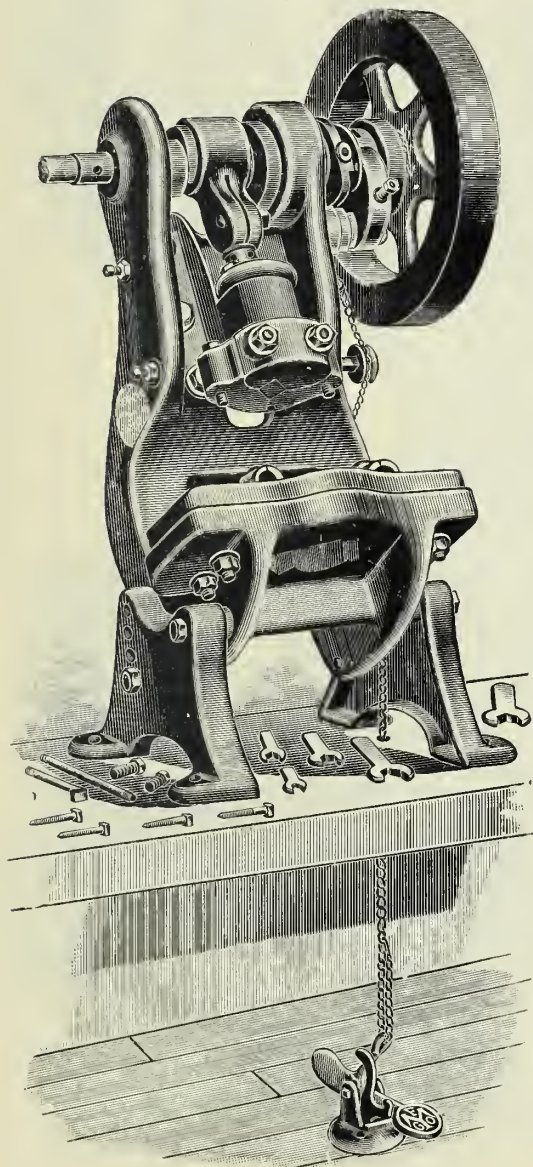
PRESS C 2.—Half Inclined.

SIX SIZES OF THIS STYLE OF PRESS.

BENCH PRESS C 101.

Weight 850 pounds.

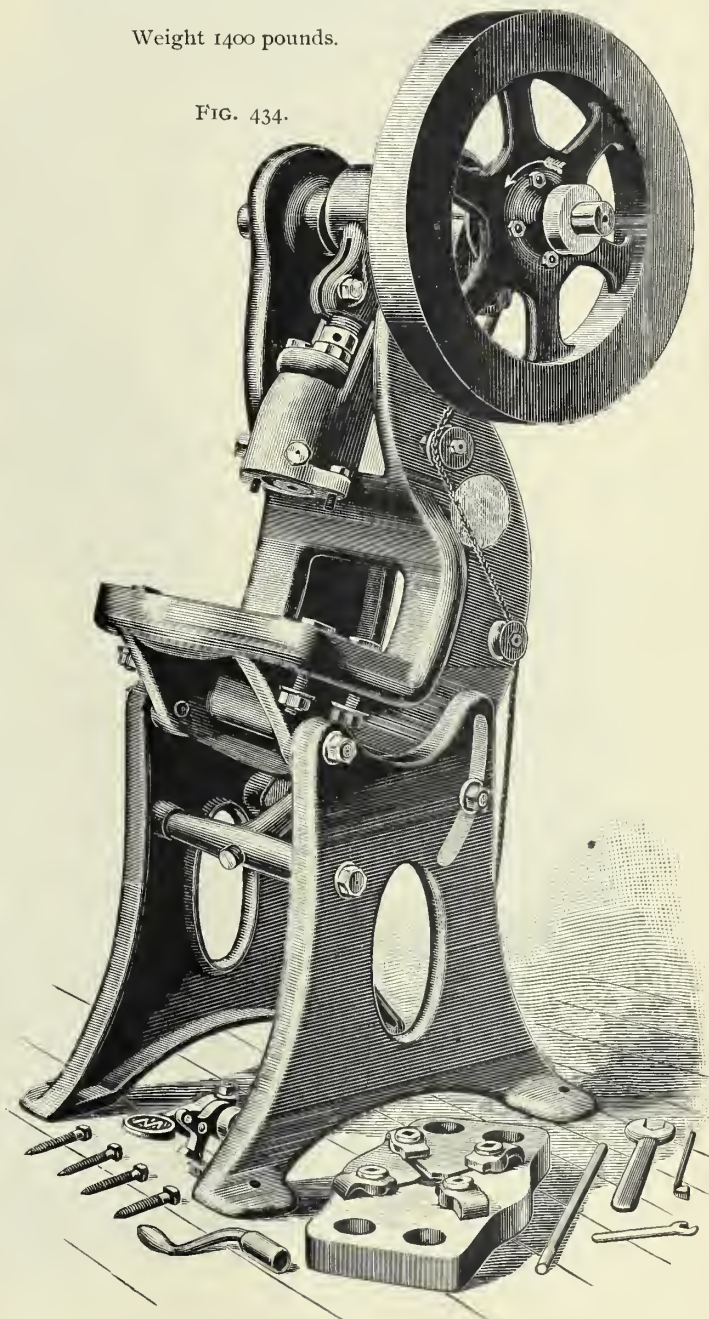
FIG. 433.



This cut represents also Bench Press C 102.
Prices on previous page.

Weight 1400 pounds.

FIG. 434.



For dimensions, descriptions, etc., see
previous page.

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FIG. 435.

PRESS C 3—Upright.

THESE PRESSES can be changed quickly from upright to inclined position or locked in any position between. If elevating attachment is not desired prices are less as given in Table C O.

Weight, 2100 pounds.

This cut represents also Presses C 4, C 5 and C 6.

For description and dimensions, prices, etc., see Table C O on page 394.

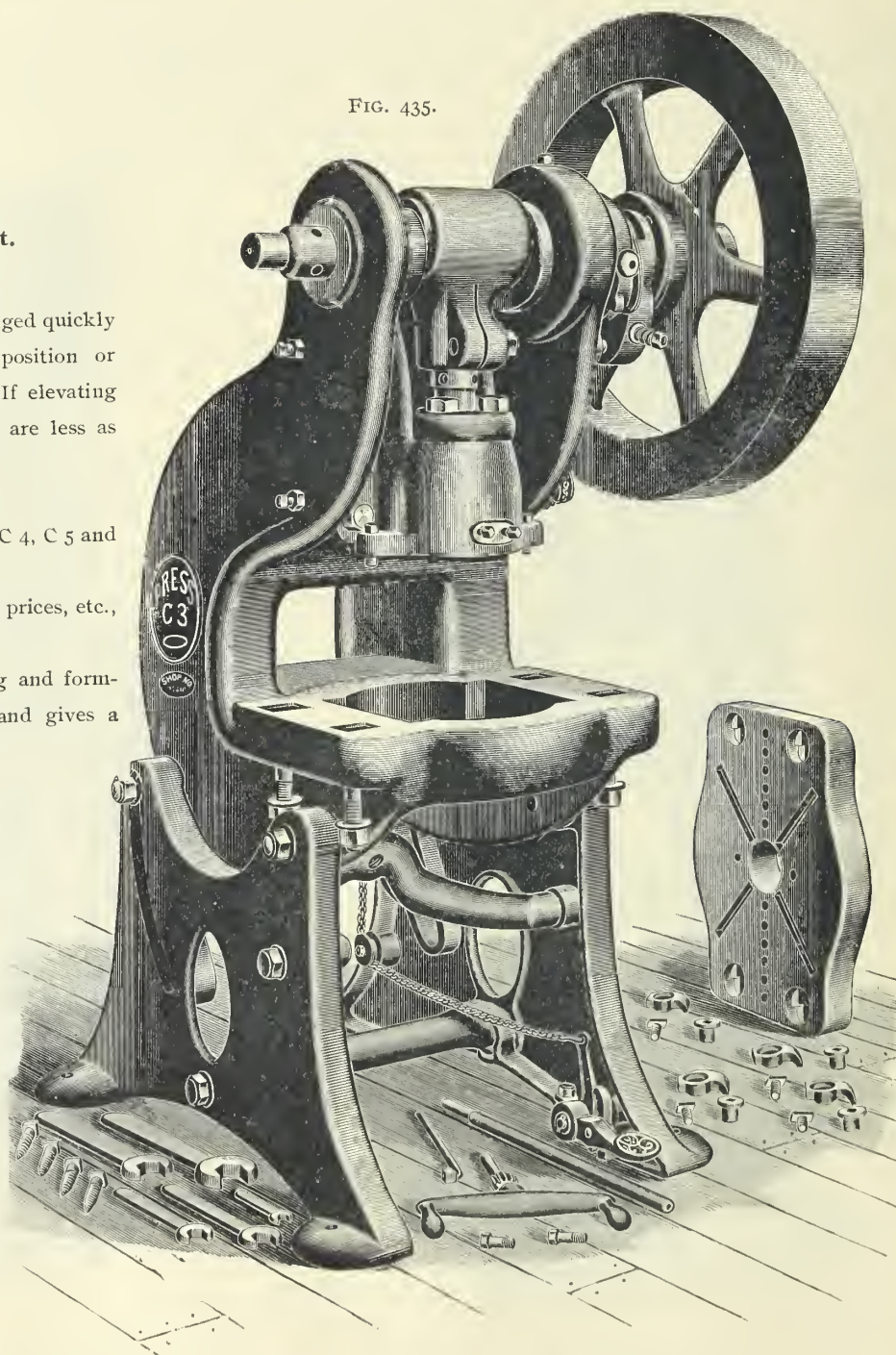
Press C 4 is adapted for cutting and forming, etc., up to 10 x 14 work and gives a pressure of 38 tons.

Press C 5 is suited for large cutting and forming up to 14 x 20 inches rectangular, or 20 inches round, and with a pressure of about 52 tons.

Weight, 5300 pounds.

Press C 6 will do similar work up to 20 x 28 inches, or 28 inches round, and to about 68 tons.

Weight, 8300 pounds.



PRESS C 53.
ADJUSTABLE BED.

For cutting, horning, wiring and curling,
etc.

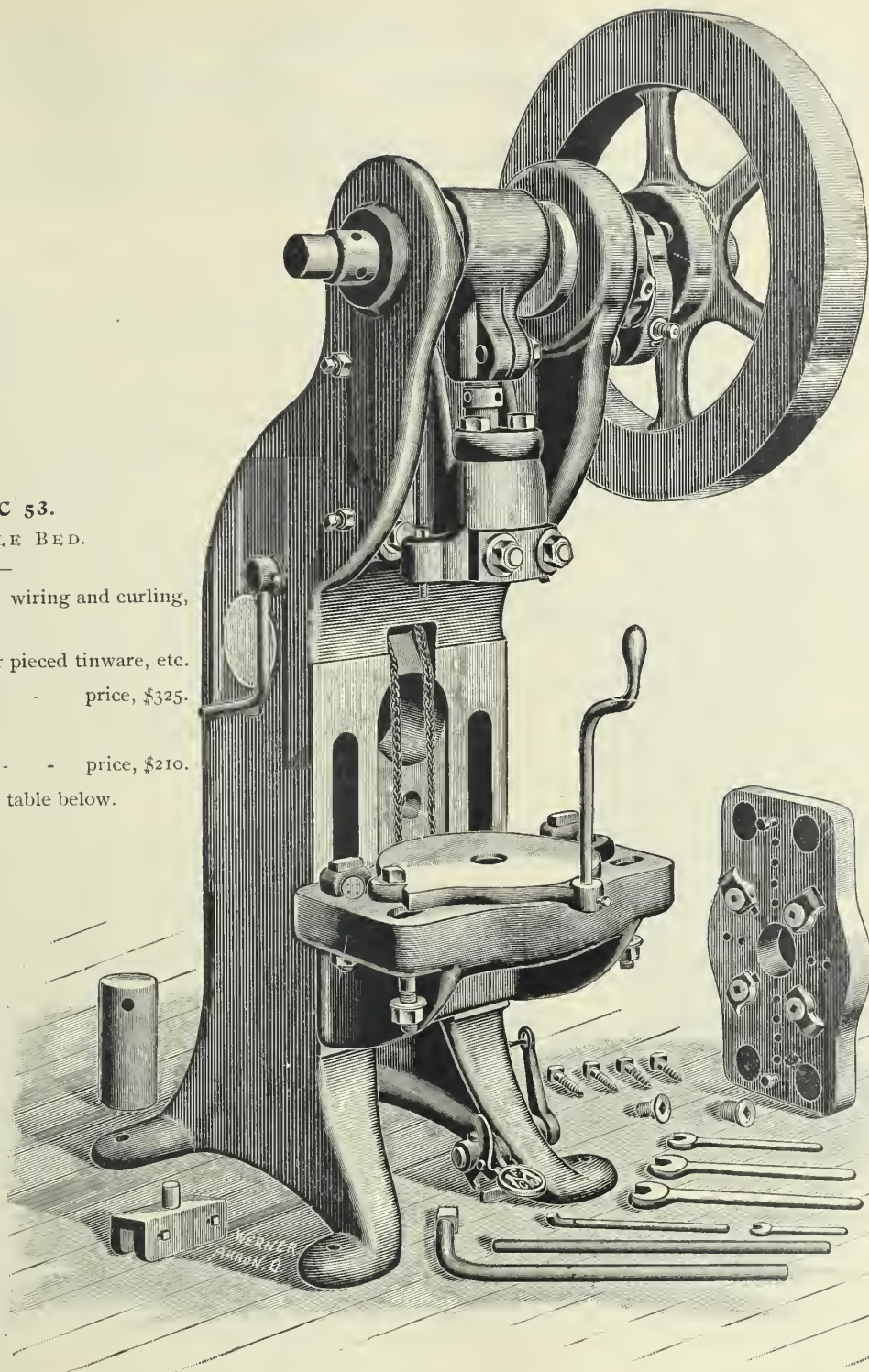
Especially adapted for pieced tinware, etc.

Weight, 2350 lbs., - - price, \$325.

Complete as shown.

For horning only, - - price, \$210.

Five sizes are given in table below.



Nominal size, - - - - -		press	C 51	C 52	C 53	C 54	C 55
1st	Price without bed or other attachments, - - - - -	\$	110	150	210	300	450
2d	Price with horn, force-chuck and force, but without bed. For horning only, - - - - -	\$	125	170	235	335	505
3d	Price with bed, bolster and bushing, etc. For cutting, etc., but not for horning or wiring, - - - - -	\$	140	190	270	390	580
4th	Price with bed, bolster, bushing and table, etc. For cutting, etc., also wiring, - - - - -	\$	150	205	290	415	610
5th	Price with bed, bolster, bushing horn, force-chuck, force, etc. For cutting, etc., also horning, - - - - -	\$	155	210	295	425	635
6th	Price with bed, bolster, bushing, horn, force-chuck, force, table, etc. For cutting etc., and also horning and wiring, as shown in cut above, - - - - -	\$	165	225	315	450	665
Weight, complete, about, - - - - -		pounds	1000	1550	2400	3650	5500
The dimensions are about as given for - - - - -		press	C 1	C 2	C 3	C 4	C 5



PUNCHING AND SHEARING PRESSES, WITH SHALLOW THROATS.

SIX SIZES.

AS FORMERLY built from lighter patterns, they were known as presses 50, 51, 52, etc. These six sizes of punching presses are adapted especially for cutting and punching articles in bar and thick sheet metals, such as nuts and washers, parts of hardware, nails, locks, cutlery, carriage goods, gas fixtures, lamps, clocks, watches, jewelry, silver and brass work, electrical apparatus, musical instruments, textile machinery, agricultural implements, various instruments and tools, and for trimming drop forgings, etc., also for shearing and forming work.

They are built with the frame extending down in the form of a square, hollow pedestal for a support, thus making them compact and simple. The shaft extends from front to back, and the fly-wheel is at the rear. They are enormously strong and massive, and have forged steel shafts of unusually large diameter and great length of bearings, everything about them being adapted to doing hard work for a long time. All gearing is cut from solid metal (not made with rough cast teeth); the nuts and bolts are hardened and unusually large, and the wrenches are drop-forged.

Some valuable features, several of which are peculiar to these presses, may be noted, as follows, and others are being added from time to time:

First.—The general design in regard to correct proportion and beauty of appearance, speaks for itself. The metal being put just where it belongs, gives the most strength for the least cost, while harmony of proportion is secured by unbroken surfaces, flowing curves and heavily rounded corners. The finish and workmanship is much better than usually found on this class of machinery. The hollow frame gives a tool box, and the gap in frame allows cams, etc., to be used for various attachments which can be bolted on to the planed tablets provided.

Second.—A very wide ram of dove-tail section, extending up to the shaft, having great length and width of bearing, and giving consequent firmness and accuracy in the working of dies. The gib for the ram is clamped fast to a flat face, so that it cannot work loose with proper backing screws. The clamping arrangement consists of a sliding jaw with V holder, and a loose bushing allows for using various kinds of shanks.

Third.—An eccentric on front of shaft, which can be changed to order for any other of a different stroke. This is driven on to a tapering bearing, and fastened with a steel key and nut. Such construction permits the clutch collar to be forged solid upon shaft, which is an important feature.

Fourth.—The motion is conveyed to the ram by means of a pitman, with graduated sleeve passing through the fulcrum pin (provided with clamping and locking bolts), which gives an unusually long adjustment, and all parts are clamped securely, so there is no lost motion.

Fifth.—An improved automatic clutch, very simple and durable, the tripping device being adjustable around the axis of the shaft and so arranged that the shaft cannot make more than one revolution by one action of the treadle. There being two jaws on the wheel, the operator never has to wait more than one half of a revolution for the press to start, and the time thus saved is of considerable amount. This clutch is provided also with a "safety-lock," allowing the shaft to be revolved to any position and the dies adjusted while the fly-wheel is in motion, thus dispensing with the need of a counter-shaft. In connection with it is an adjustable spring brake, which accurately controls the motion of the press, and adapts it to various speeds and conditions. It is connected to the treadle which has a locking device for continuous running.

Sixth.—The fly-wheel is provided with two (or more) steel jaws and extra "spring locks," when required, to prevent "back-lash." The oiling arrangements allow for lubricating when running. The fly-wheel rims are extra heavy and wide, thus giving ample belt power.

Seventh.—The bolster with steel clamps allows for various sizes of die plates, and strippers may be bolted on to the tablets provided. The table on this page gives the sizes of bolsters which may be ordered, and also various other extras and variations for special work.

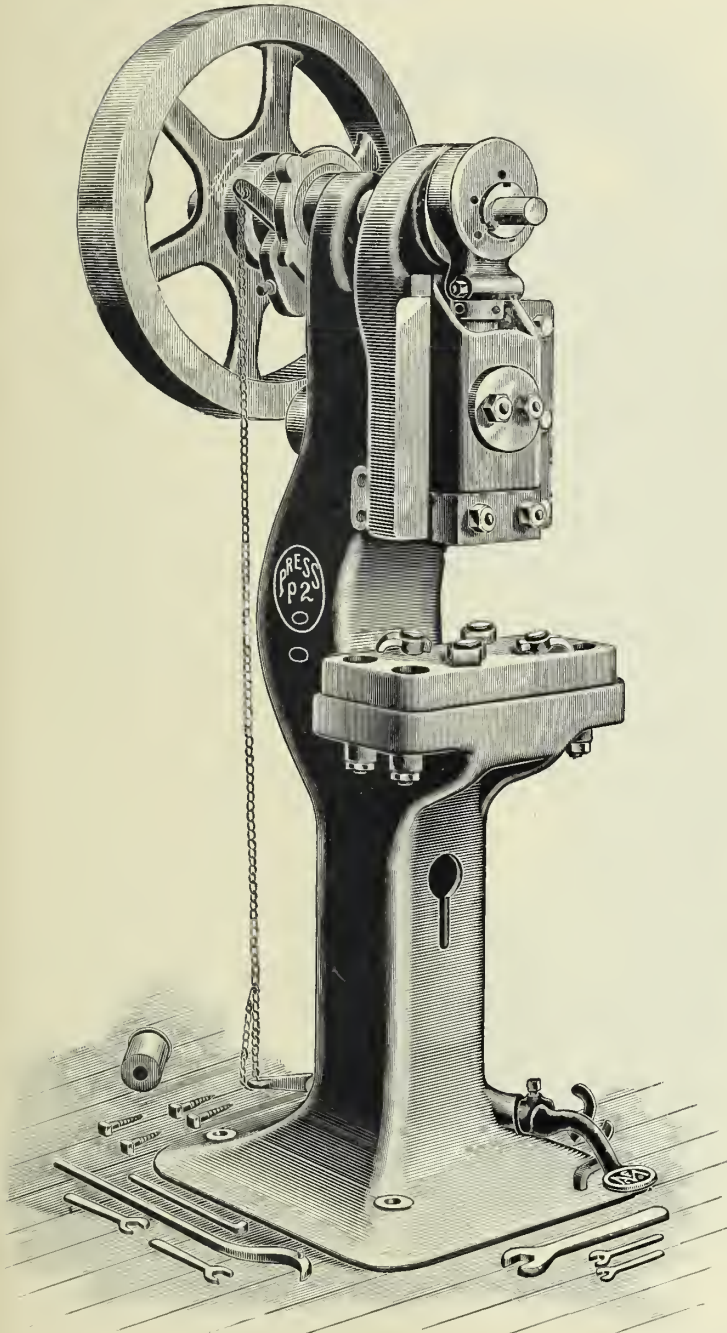
Eighth.—The forged steel shafts, etc., and the steel and iron castings, bolts, nuts, etc., are all of the best quality throughout and a set of drop-forged wrenches and floor bolts are provided.

PRICES, DIMENSIONS, ETC., TABLE P O.

Nominal size, - - - - -	press	P 1	P 2	P 3	P 4	P 5	P 6
Price—without bolster and bushing, - - - - -	\$	170	220	295	410	575	835
Price—with bolster and bushing, - - - - -	\$	180	230	310	430	600	870
Weight—about - - - - -	pounds	1050	1800	2850	4300	6500	10000
Hole through bed—front to back, - - - - -	inches	4	4	6	8	10	12
Hole through bed—width, - - - - -	inches	4	6	8	10	12	14
Throat, from center of ram back to frame, - - - - -	inches	5	6	7	8½	10	12
Height bed to ram at top of stroke and adjustment, - - - - -	inches	8½	9	9½	10	10½	11
Size square recess in ram, to grip punches (set diagonally), - - - - -	inches	2	2	2	3	3	3
Height of square recess—length of shank it will take, - - - - -	inches	3	3	3	3	3	3
Stroke of ram—standard, - - - - -	inches	1½	1½	1½	1½	1½	1½
Stroke of ram—maximum—to order, - - - - -	inches	2½	3	3½	4	4½	5
Adjustment of ram—downward, - - - - -	inches	3	3	3	3	3	3
Diameter of fly-wheel, - - - - -	inches	25	30	35	40	45	50
Width of fly-wheel, - - - - -	inches	4	5	6	7	8	9
Weight of fly-wheel—about, - - - - -	pounds	275	475	750	1100	1500	2000
Speed per minute—about, - - - - -	revolutions	120	110	100	90	80	70
Thickness iron punchable with 1 in. round dies—about, - - - - -	inches	¼	¼	¼	⅝	⅞	1
Size of flat iron that can be sheared, - - - - -	inches	¼ x 3	⅝ x 4	¾ x 5	7⁄8 x 6	1½ x 7	⅝ x 8
Size of round iron that can be sheared, - - - - -	inches	1½	1½	1½	1¾	1½	1½
Thickness of bolster, - - - - -	inches	1½	2	2½	3	3½	4
Diameter central hole in bolster, - - - - -	inches	2¼	2¼	2¼	2¼	2¼	2¼
Pressure exerted by ram—about, - - - - -	tons	12	24	38	52	68	84

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FIG. 437.

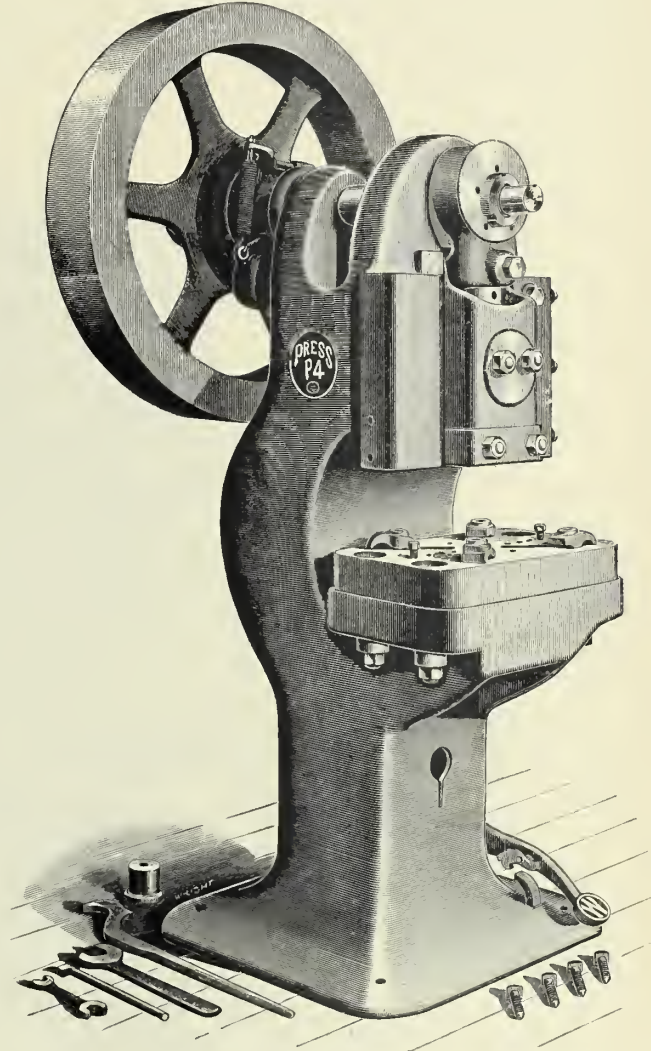


PUNCHING PRESS P 2.

Weight, 1800 pounds. Price, \$210, without bolster.

This cut represents Presses P 1 and P 2. For dimensions, weights, prices, etc., see Table P O, on opposite page.

FIG. 438.



NEW PUNCHING PRESS P 4.

Weight, 4300 pounds. Price, without bolster, \$410.

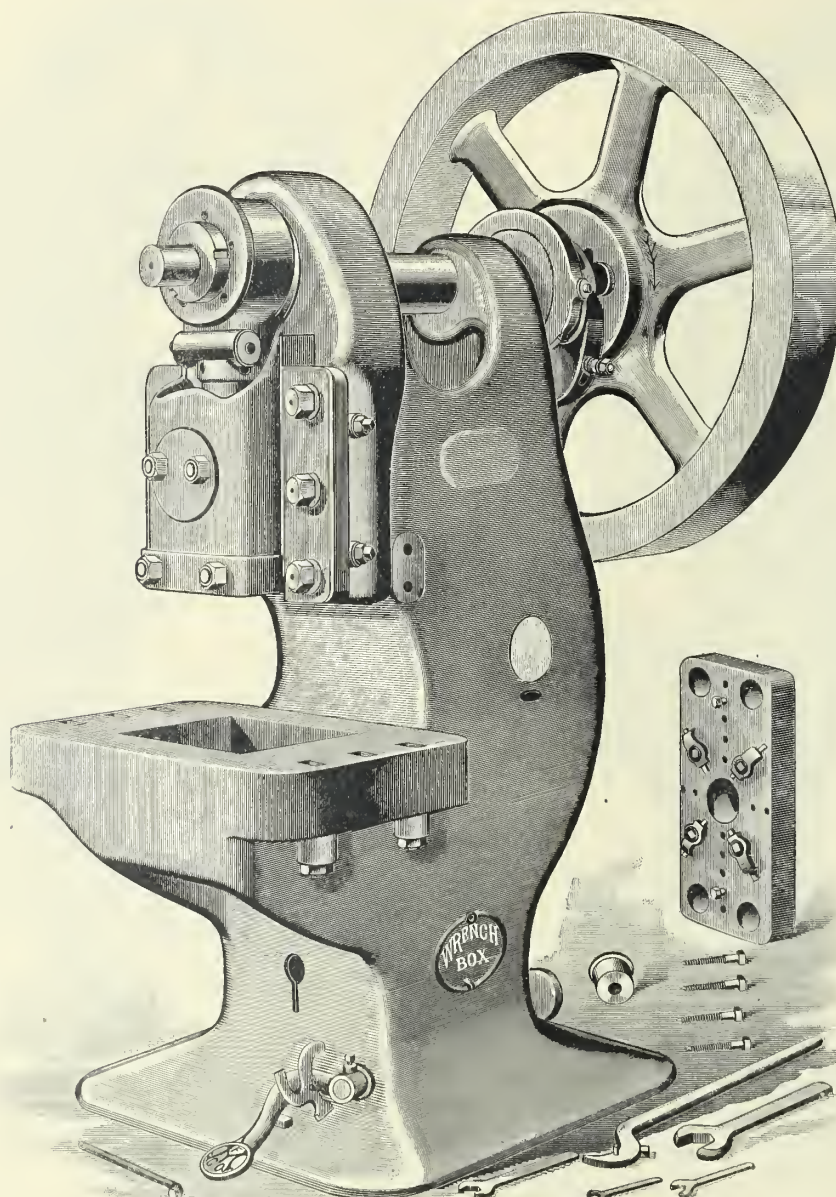
THIS cut represents all the most recent improvements in the whole line of Punching Presses (the other cuts not showing the latest designs), and attention is called to the new clutch C, the extra heavy wheel W, the new Pitman lock at P, the new form of gib G, and to the external ribs on frame. The whole frame is also much heavier and stronger, and there are some other minor improvements.

This cut represents all the latest improvements as now embodied in all sizes.

Dimensions, etc., are given in Table P O.

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FIG. 439.



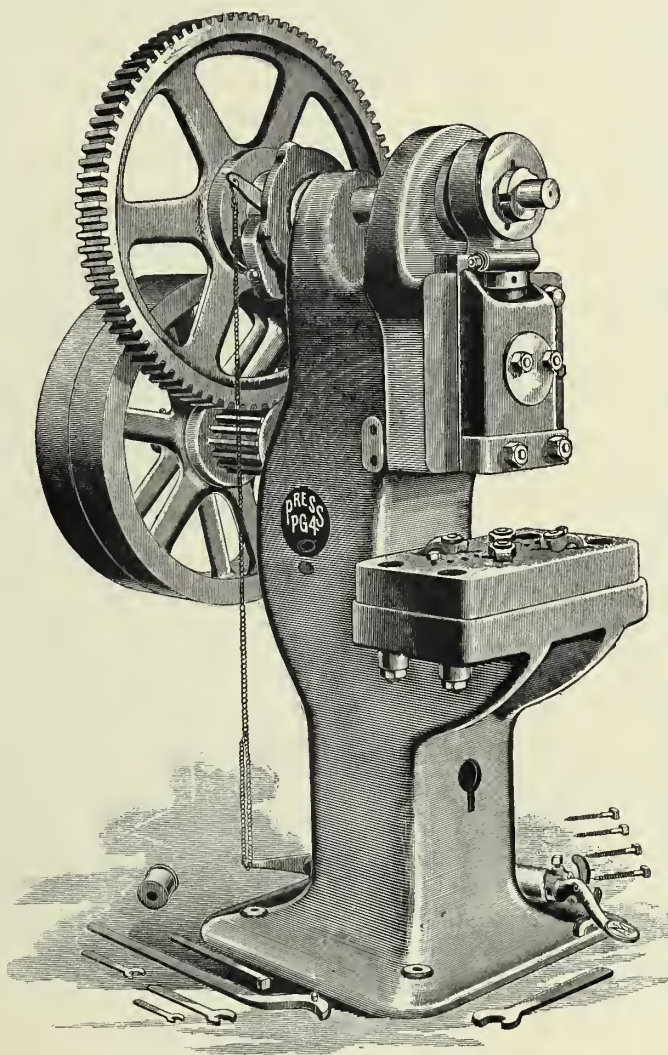
PUNCHING PRESS P 6.

Weight,	-	-	-	-	-	10000 pounds
Price, without bolster,	-	-	-	-	-	\$835.00

This cut represents presses P 5 and P 6. For dimensions, etc., see Table P O on previous page.

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FIG. 440.



GEARED PUNCHING PRESS PG 4.

Weight, - - - - 4750 pounds.

Price, without bolster, - - \$510.00.

This cut represents any of the six sizes of punching presses when built with gearing, but all the improvements shown in P, are embodied. Six sizes. For dimensions, weights, prices, etc., see Table PG O, next page.

TABLE PG 0—GEARED POWER PUNCHING PRESSES.

Nominal size,	Press	PG 1	PG 2	PG 3	PG 4	PG 5	PG 6
Price, without bolster and bushing,	\$	220	280	375	510	695	985
Price, with bolster and bushing,	\$	230	290	390	530	720	1020
Weight, about,	pounds	1150	2000	3150	4750	7100	11000
Diameter of fly-wheel and loose pulley,	inches	15	20	25	30	35	40
Width, each of fly-wheel and loose pulley,	inches	3	3	4	5	6	7
Weight of fly-wheel, about,	pounds	100	175	275	475	750	1100
Speed of fly-wheel and loose pulley per minute, about,	revolutions	480	420	360	300	240	180
Speed of main shaft per minute, about,	revolutions	80	70	60	50	40	30
Thickness iron punchable with 1 inch round dies, about,	inches	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{11}{16}$	$\frac{7}{8}$	$1\frac{1}{8}$
Size of flat iron which can be sheared,	inches	$\frac{5}{16} \times 3$	$\frac{3}{8} \times 4$	$\frac{7}{16} \times 5$	$\frac{1}{2} \times 6$	$\frac{5}{8} \times 7$	$\frac{3}{4} \times 8$
Size of round iron which can be sheared,	inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Pressure exerted by ram, about,	tons	12	24	38	52	68	84
Other dimensions,					As in Table P-O.		

GEARED POWER PUNCHING PRESSES.

Geared presses are required if the material is as thick as the diameter of the hole punched, and are preferable if the material is very hard or over half an inch thick in any case. They are also preferable for many other kinds of work requiring considerable power or a slow motion in forming work, etc. These geared presses are fitted up with all the good features, and with the general dimensions which are mentioned on page 393, but with gearing instead of plain fly-wheels. The gear and pinion have "cut" (not cast) teeth, and a fly-wheel, and loose pulley (with safety guard) are provided so they can be run directly from line shafting, thus saving the expense of a countershaft.

Prices, dimensions, etc.—Table PG 0 above.

ATTACHMENTS, SUCH AS FEED ROLLS, DIAL FEEDS, ETC.,

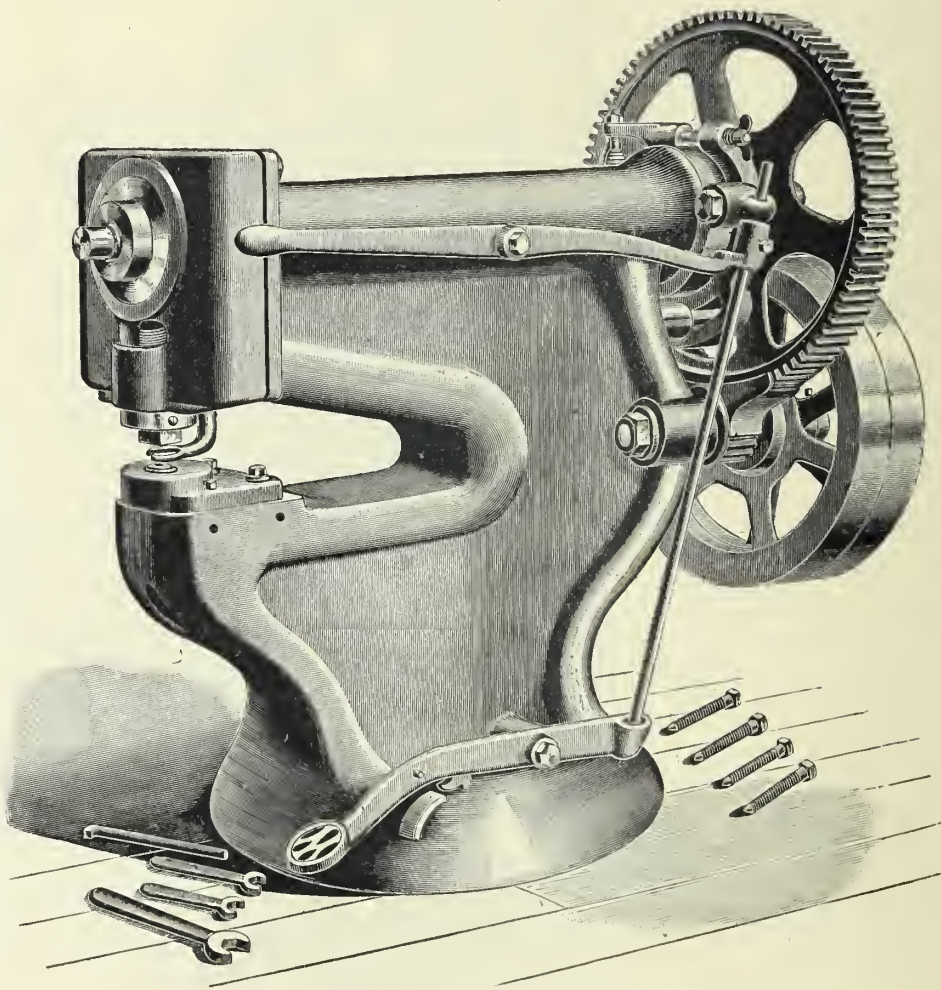
will be built to order for the punching presses, and there are several kinds for special work, as follows: single feed rolls, double feed rolls, sliding feed attachments, placed either at front or on one side of the bed, and dials or turntables for feeding blanks into forming dies, etc. There are also several attachments, such as automatic finger gauges, spring drawing attachments, scrap clippers, etc., mentioned on page 398. Estimates on all of these will be given on receipt of samples or drawing showing the kind of work to be done.

PUNCHING AND SHEARING TOOLS, ETC.,

will be furnished, if desired, with these presses (at extra cost), and a complete system of shearing chucks, also punch and die chucks or combined shearing and punching chucks have been devised for them. Special shear blades, for round, flat and angle iron, etc., and also all necessary hold-downs, adjustable gauges, etc., as well as punches and dies of every description, will be estimated on if desired, and as they are built in quantities on a regular system, they can be furnished at moderate prices.

SPECIAL DEEP THROAT PUNCHING PRESSES PG 43.

FIG. 441.



This cut represents Press PG 43.

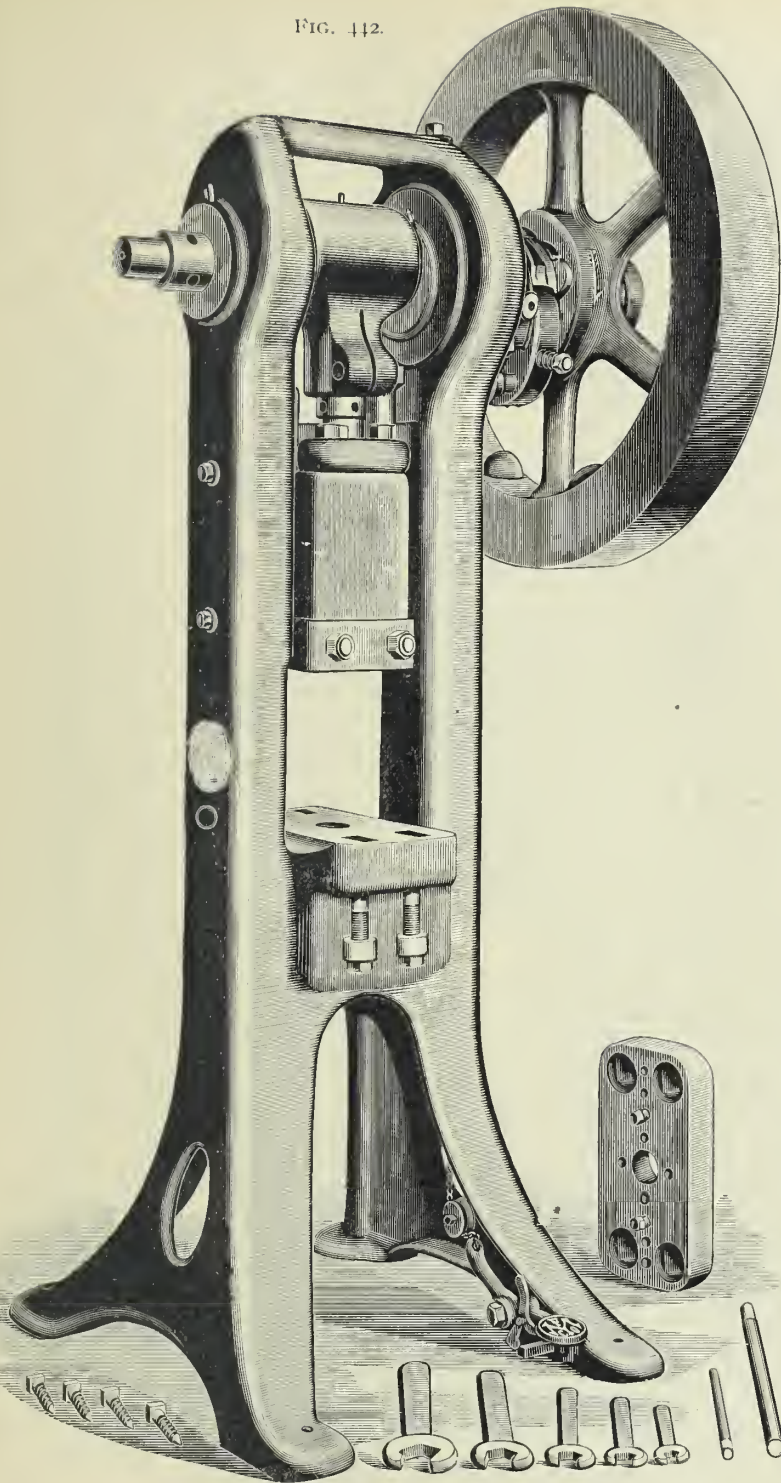
FOUR SIZES DEEP THROATED PRESSES.

The four sizes of deep throated presses are adapted for shearing and punching tank or light boiler work, and for any other purpose where a deep throat is required. They have an automatic clutch, simple adjustment, and most of the improvements mentioned for presses P 1, etc.

TABLE P 20, ETC., P 40, ETC.

Nominal size of presses,	Press	NON-GEARED. P 21	NON-GEARED. P 43	GEARED. PG 21	GEARED. PG 43
Price complete, as shown, except dies,	\$	220	560	270	640
Weight, about,	pounds	1300	5000	1400	5300
Throat, centre of ram back to frame,	inches	18	30	18	30
Height bed to ram, when up,	inches	$8\frac{1}{2}$	$9\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$
Stroke of ram,	inches	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Diameter of fly-wheel,	inches	25	35	15	25
Speed of fly-wheel,	revolutions	120	100	480	360
Speed of main shaft,	revolutions	120	100	80	60
Other dimensions as given in,	table	P O	P O	PG O	PG O

FIG. 442.



STRAIGHT COLUMN EMBOSsing PRESS E 3.

SIX SIZES OF EMBOSsing PRESSES CLASS E—SERIES

E O—EMBOSsing PRESSES—POWER

STRAIGHT COLUMN.

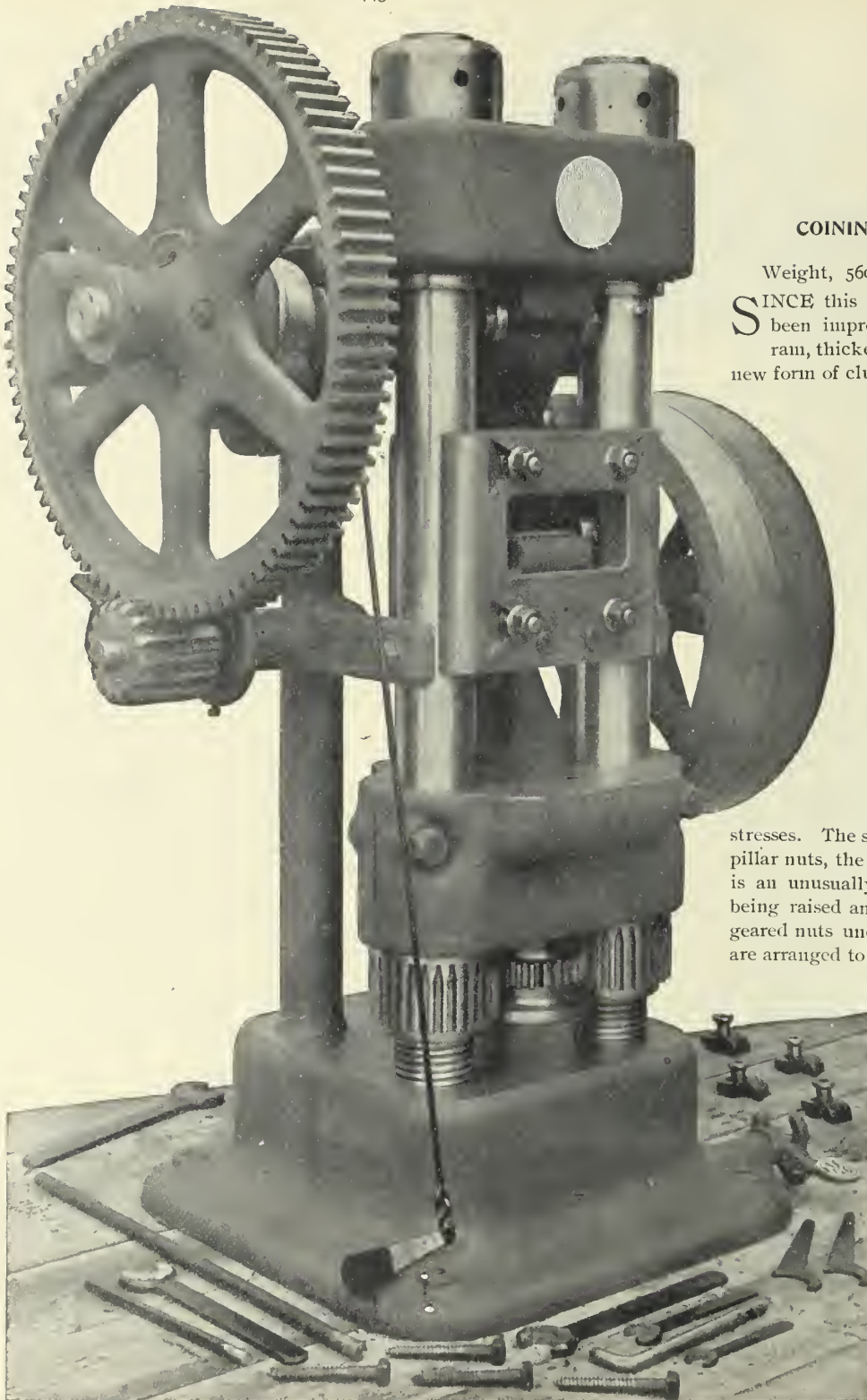
Weight, 2800 pounds.

Price, \$375.

Without bolster, etc.

THESE presses are of entirely new design, and have many of the good features previously mentioned on pages 393 and 398, in regard to classes C and P, but are adapted especially for embossing (as well as cutting, punching, etc.), the columns being solid, very strong, rigid and close together, thus eliminating most of the "spring" incident to presses of a more "spread out" order. They are particularly useful for watch-cases, jewelry and similar work, but have proved very popular also for bicycle work, hardware, locks, sewing machines and typewriter parts and many other lines where great strength, stiffness and accuracy is essential. The largest size is adapted for very heavy work.

Nominal size,	-	-	-	Press	E 1	E 2	E 3	E 4	E 5	E 6
Price, without bolster and bushing,	-	-	-	\$	190	260	375	550	800	1170
Price, with bolster and bushing,	-	-	-	\$	200	270	390	570	825	1200
Weight—about	-	-	-	pounds	1000	1700	2800	4500	7000	10500
Width between columns—clear,	-	-	-	inches	9	10	11	13	15	17
Height to ram—when up,	-	-	-	inches	9	9½	10	10½	11	11½
Stroke of ram,	-	-	-	inches	2	2	2	2	2	2
Adjustment of ram—downward,	-	-	-	inches	3	3	3	3	3	3
Diameter of fly-wheel,	-	-	-	inches	25	30	35	40	45	50
Width of fly-wheel,	-	-	-	inches	4	5	6	7	8	9
Weight of fly-wheel—about	-	-	-	pounds	275	475	750	1100	1500	2000
Pressure exerted by ram—about	-	-	-	tons	12	24	38	52	68	84
Size of each column,	-	-	-	inches	2 x 6	3 x 7	4 x 8	5 x 9	6 x 11	7 x 13

**COINING PRESS E G 24.**

Weight, 5600 pounds. Price, \$1000.

SINCE this cut was made the Press has been improved with wider bed, longer ram, thicker pillar nuts, higher columns, new form of clutch and toggle, bearings, etc.

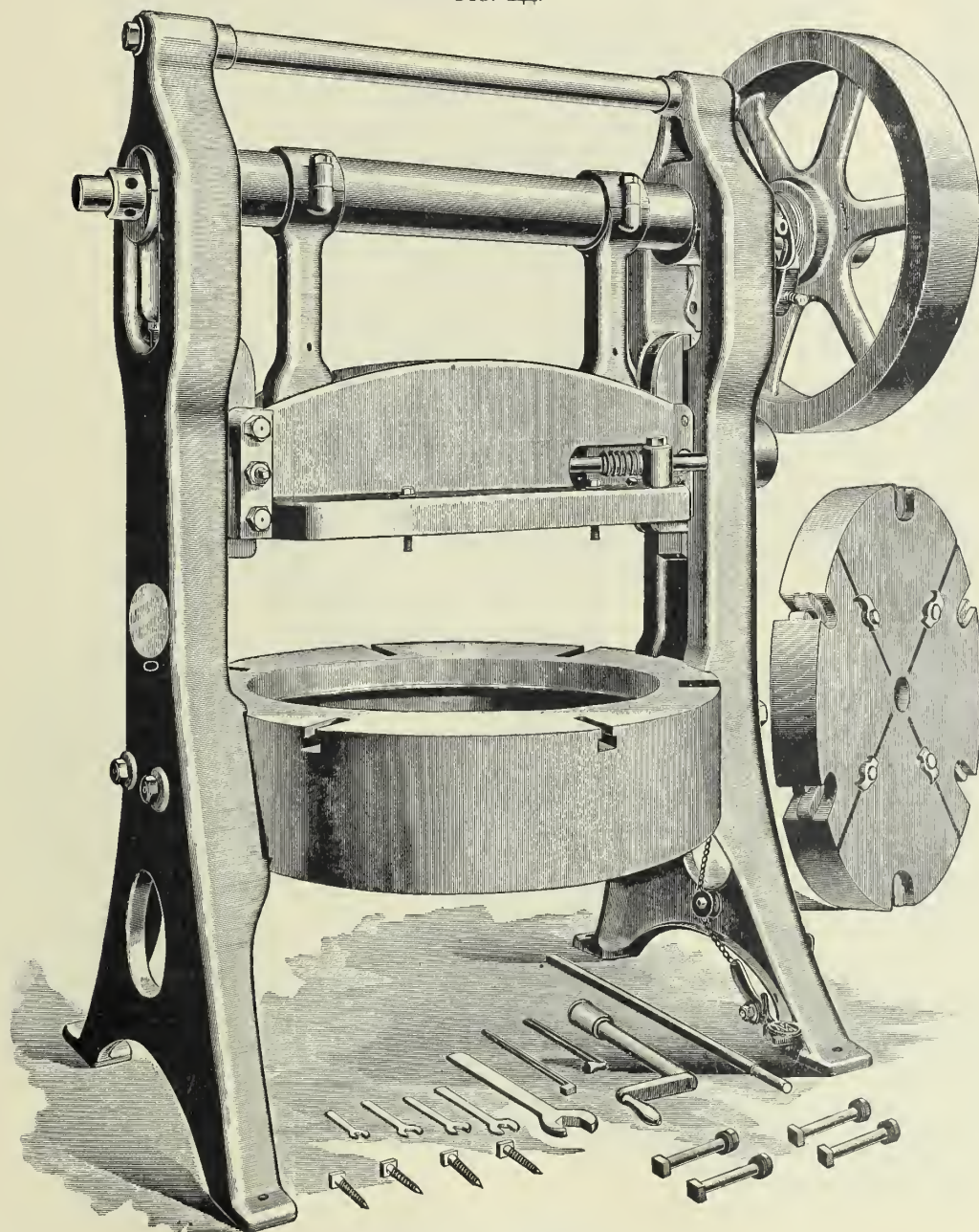
This is a new form of press, especially designed for fine embossing and coining, where a very heavy pressure is required. They are intended for work on badges, medals, jewelry, watch cases, small silverware and other similar articles, but can be used also for punching, cutting, forming, flattening and compressing operations upon a great variety of work. They are built with two solid forged steel columns to take the heavy tensile stresses. The shafts are of steel, also the four pillar nuts, the ram and the toggles. There is an unusually long adjustment, the bed being raised and lowered by means of the geared nuts underneath it, and the toggles are arranged to give a quick-return motion to the ram—thus concentrating the pressure during a longer time. The main shaft is driven by an automatic-stop-clutch operated by the treadle, which is provided with a treadle-lock as usual. The bed is solid, and ram has clamping devices as in Punching Presses.

TABLE E 20, ETC.

	NON-GEARED				GEARED	
	E 24	E 26	EG 24	EG 26		
Nominal size, - - - - -	880	2320	980	2470		
Price, without bolster and bushing, - - - - -	900	2350	1000	2500		
Price, with bolster and bushing, - - - - -	5300	15000	5600	16000		
Weight, about - - - - -	200	500	200	500		
Pressure erected by ram, about - - - - -						

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FIG. 441.



ROUND BED PRESS S 3.

Weight, 7850 pounds, with bolster.

Price, without bolster, \$720.

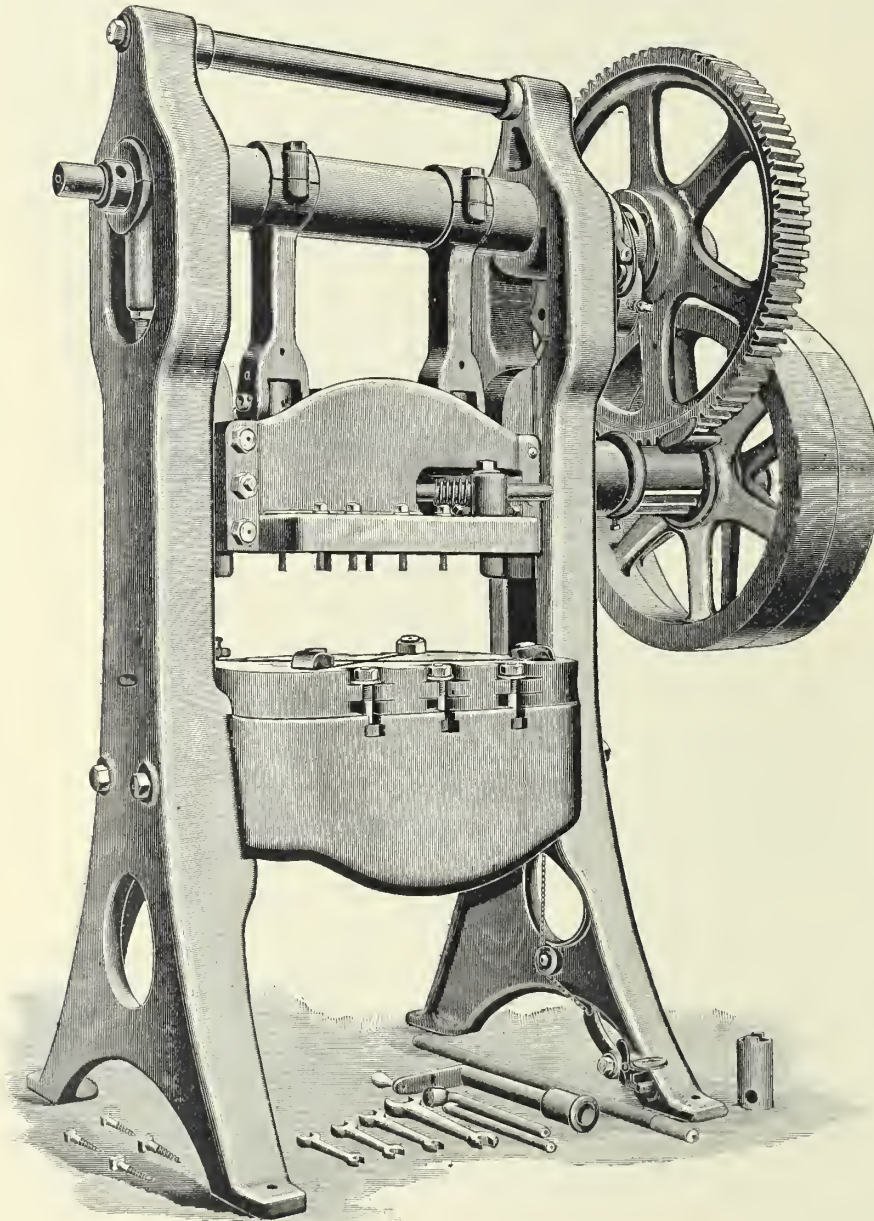
Distance between columns, 46 inches.

These Round Bed Presses, from the light patterns, are adapted for cutting out blanks for stamped tinware, stove boards, pieced tinware sections, and especially for armature discs, etc., and when built with gearing for the above work, also for forming and light embossing in various round shapes in thin metals, up to 1-32 inch thick. WHEN BUILT FROM THE HEAVY PATTERNS they are adapted for thicker metals, up to 1-16 inch thick, and when geared for still thicker cutting, and also for a great variety of forming and embossing, etc., in metal goods.

There are 6 sizes of these Presses, from 34 inches to 64 inches between columns. Write for prices and dimensions.

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FIG. 445.



LIGHT PATTERN PRESS SG 31.

Weight, 6300 pounds.

Price, without bolster, \$700.00.

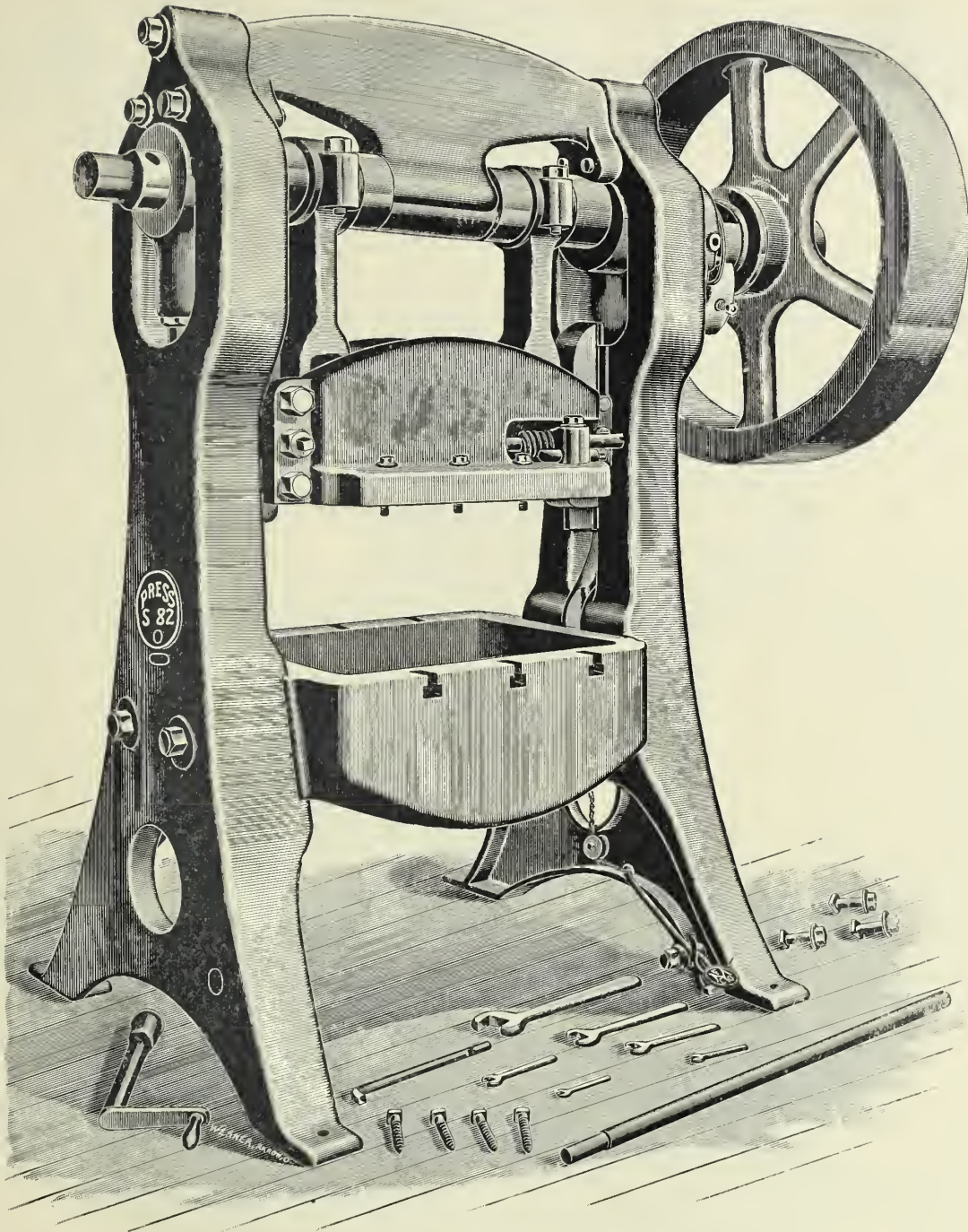
Distance between columns, 34 inches.

These nine sizes of geared presses are intended for cutting out various articles and for forming and embossing articles requiring a moderate amount of pressure, and where a slow motion is preferred.

These presses are built with "throated" columns, and also with inclined beds (to order) same as other styles.

Nine sizes of light pattern presses with gearing, also, nine sizes without gearing. Prices, without gearing, \$100.00 less on each size.

Nominal size of press with wide bed,		SG 31	SG 32	SG 33	SG 34	SG 35	SG 36	SG 37	SG 38	SG 39
Price of press without bolster, - -	\$	700	750	800	850	900	950	1020	1130	1300
Weight of press with bolster, about, - pounds		6300	6850	7500	8250	9000	9600	10900	12650	14700
Distance between columns, - - inches		34	40	46	52	55	64	72	84	100
Approximate prices of bolsters for wide beds, - - - - -	\$	40	60	80	100	120	140	160	200	240



HEAVY PATTERN PRESS 582.

Weight, 12560 pounds.

Price, \$1070, without Bolster.

These six sizes of presses are adapted for heavy sheet metal work, such as cutting and forming oil stove tops, ceiling plates, stove boards, furnace work, stoves, shovels and a great variety of work in medium thick sheet metals, also for embossing work requiring considerable pressure (up to 84 tons). Weights are about double and prices are about 60 per cent. higher than given on previous page.

Six sizes of heavy pattern presses, as shown, also with medium and narrow beds, also same presses with bearing.



DOUBLE-ACTION DRAWING PRESSES.

Illustrated on the next two pages.

THESE PRESSES are especially adapted for cutting and drawing all kinds of deep-edged hollow work, such as shells, brass goods, boxes, cups, dishes, pans, &c., where the blank is to be held from wrinkling by the action of the ram, while the plunger descends and draws it into any cup-like shape required. Among other sheet-metals worked in such machines are tin-plate, steel, iron, brass, copper, britannia, silver, gold, aluminium, etc.

To those not acquainted with the "drawing" process, it may be interesting to know that it consists in holding the "blank" of sheet metal between two flat surfaces under pressure (sometimes several tons), whilst the central descending punch draws it from between them in a conical or cylindrical shape, leaving the sides without wrinkles—the metal being "upset" or thickened circumferentially, and stretched or drawn out radially, as the outer parts are reduced in diameter. In tapering work, such as pans, cups, &c., part of the metal is unsupported while being drawn, and "body wrinkles" sometimes form. These are afterwards smoothed out in a spinning lathe, as described on another page.

THROATED DOUBLE-ACTION DRAWING PRESSES.

Illustrated on next page.

TABLES D O AND DG O

NON-GEARED DRAWING—DOUBLE ACTION.

GEARED DRAWING—DOUBLE ACTION.

Nominal size	Press	D 1	D 2	D 3	D 4	D 5	D 6	DG 1	DG 2	DG 3	DG 4	DG 5	DG 6
Price, without bolster, bushings and shanks, - - -	\$	210	280	390	550	830	1350	260	340	470	650	950	1500
Price, with bolster, bushings and shanks, - - -	\$	230	300	420	600	900	1450	280	360	500	700	1020	1600
Weight, with bolster, bushings and shanks, about	pounds	1200	1800	2900	4700	7400	12700	1200	1800	2900	4800	7600	13000
Hole through bed, round, - - -	inches	7	7	8	10	14	18	7	7	8	10	14	18
Throat, center of ram back to frame, - - -	inches	5	6	7	9	11	13	5	6	7	9	11	13
Hole back through frame, width, - - -	inches	8	9½	11	13	16½	21	8	9½	11	13	16½	21
Height, bed to ram, when up, - - -	inches	8½	9	10	12	14½	18	8½	9	10	12	14½	18
Stroke of ram, standard, - - -	inches	1½	1½	2	2½	3½	4½	1½	1½	2	2½	3½	4½
Adjustment of ram, downward, - - -	inches	3	3	3	3	3	3	3	3	3	3	3	3
Height, bed to plunger, when up, - - -	inches	11½	12	14	17	21½	27	11½	12	14	17	21½	27
Stroke of plunger, - - -	inches	3	3	4	5	7	9	3	3	4	5	7	9
Adjustment of plunger, downward, - - -	inches	3	3	3	3	4	5	3	3	3	3	4	5
Fly-wheel, diameter, - - -	inches	25	30	35	40	45	50	15	20	25	30	35	40
Fly-wheel, width of face, - - -	inches	4	5	6	7	8	9	3	3	4	5	6	7
Fly-wheel, weight, - - -	pounds	275	475	750	1100	1500	2000	100	175	275	475	750	1100
Speed of fly-wheel per minute, about - - -	revolutions	110	100	90	80	70	60	480	420	360	300	240	180
Speed of main shaft per minute, about - - -	revolutions	110	100	90	80	70	60	80	70	60	50	40	30
Height, extreme, about - - -	inches	74	77	84	93	104	117	72	74	82	91	101	113
Bolster thickness, - - -	inches	1½	2	2½	3	3½	4	1½	2	2½	3	3½	4
Bolster hole, round, - - -	inches	4½	4½	5½	7½	10½	14½	4½	4½	5½	7½	10½	14½
Pressure exerted by ram and plunger, - - -	tons	12	24	38	52	68	84	12	24	38	52	68	84
Drawing to maximum depth of - - -	inches	1½	1½	2	2½	3½	4½	1½	1½	2	2½	3½	4½
Drawing "pushthrough" work to diameter of - - -	inches	3	4	5	7	10	14	3	4	5	7	10	14
Drawing ditto from blank diameter of - - -	inches	5	6	8	11	16	22	5	6	8	11	16	22
Drawing shallow work up to blank diameter of - - -	inches	8	9	11	15	20	26	8	9	11	15	20	26

These Presses are also built with and without gearing as Single-Action Presses, for deepening, &c. Prices about 10 per cent. less.

STRAIGHT COLUMN DOUBLE-ACTION DRAWING PRESSES.

Illustrated on second page ahead.

TABLES D 51 AND DG 51.

NON-GEARED DRAWING—DOUBLE ACTION.

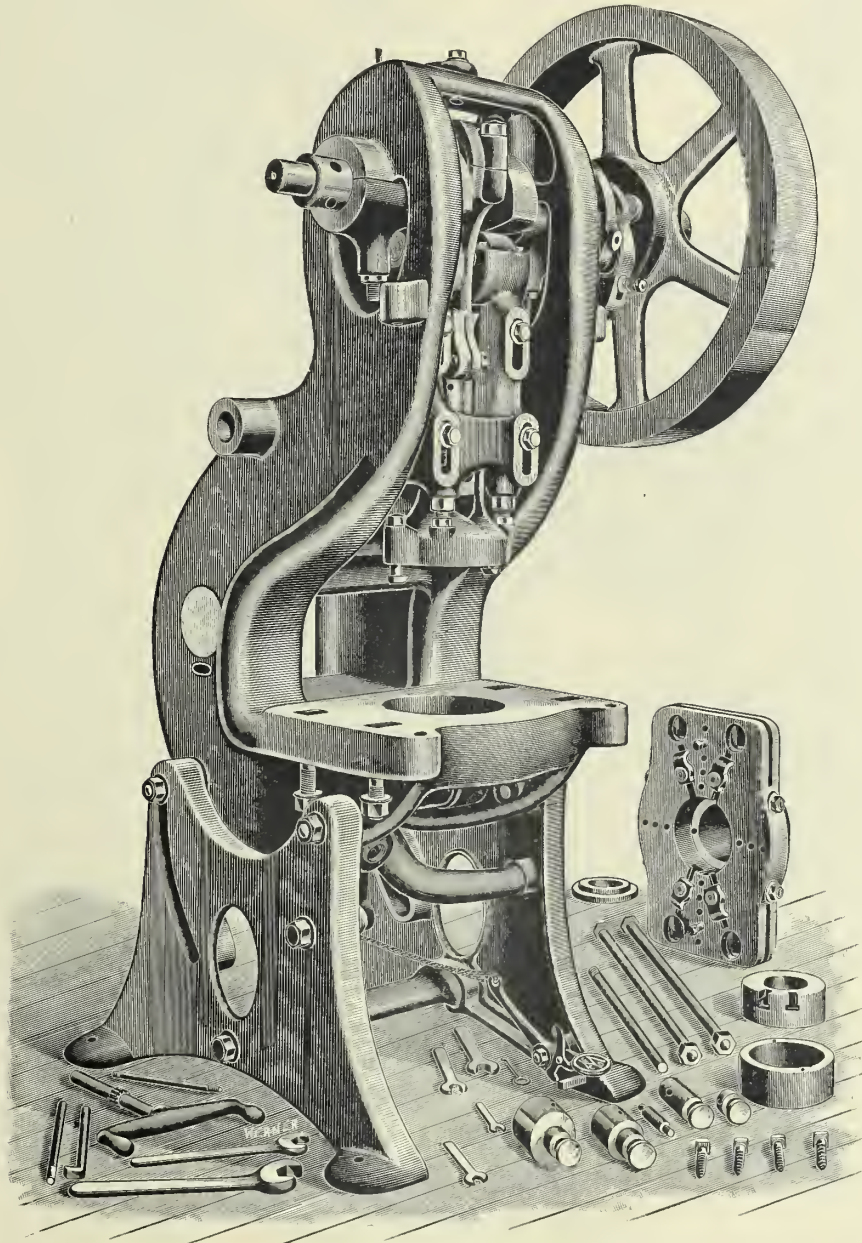
GEARED DRAWING—DOUBLE ACTION.

Nominal size	Press	D 51	D 52	D 53	D 54	D 55	D 56	DG 51	DG 52	DG 53	DG 54	DG 55	DG 56
Price, without bolster, bushings and shanks, - - -	\$	190	250	340	470	700	1100	240	310	420	570	820	1300
Price, with bolster, bushings and shanks, - - -	\$	210	270	370	520	770	1200	260	330	450	620	890	1400
Weight, with bolster, bushings and shanks, about	pounds	1100	1600	2600	4200	6500	11700	1100	1600	2600	4300	6700	12000
Hole through bed, round, - - -	inches	7	7	8	10	14	18	7	7	8	10	14	18
Columns, width between, inside, - - -	inches	12	14	16	19	23	30	12	14	16	19	23	30
Height, bed to ram, when up, - - -	inches	8½	9	10	12	14½	18	8½	9	10	12	14½	18
Stroke of ram, standard, - - -	inches	1½	1½	2	2½	3½	4½	1½	1½	2	2½	3½	4½
Adjustment of ram, downward, - - -	inches	3	3	3	3	3	3	3	3	3	3	3	3
Height, bed to plunger, when up, - - -	inches	11½	12	14	17	21½	27	11½	12	14	17	21½	27
Stroke of plunger, - - -	inches	3	3	4	5	7	9	3	3	4	5	7	9
Adjustment of plunger, downward, - - -	inches	3	3	3	3	4	5	3	3	3	3	4	5
Fly-wheel, diameter, - - -	inches	25	30	35	40	45	50	15	20	25	30	35	40
Fly-wheel, width of face, - - -	inches	4	5	6	7	8	9	3	3	4	5	6	7
Fly-wheel, weight, - - -	pounds	275	475	750	1100	1500	2000	100	175	275	475	750	1100
Speed of fly-wheel per minute, about - - -	revolutions	110	100	90	80	70	60	480	420	360	300	240	180
Speed of main shaft per minute, about - - -	revolutions	110	100	90	80	70	60	80	70	60	50	40	30
Height, extreme, about - - -	inches	74	77	84	93	104	117	72	74	82	91	101	113
Bolster thickness, - - -	inches	1½	2	2½	3	3½	4	1½	2	2½	3	3½	4
Bolster hole, round, - - -	inches	4½	4½	5½	7½	10½	14½	4½	4½	5½	7½	10½	14½
Pressure exerted by ram and plunger, - - -	tons	12	24	38	52	68	84	12	24	38	52	68	84
Drawing to maximum depth of - - -	inches	1½	1½	2	2½	3½	4½	1½	1½	2	2½	3½	4½
Draw "pushthrough" work to diameter of - - -	inches	3	4	5	7	10	14	3	4	5	7	10	14
Drawing ditto from blank diameter of - - -	inches	5	6	8	11	16	22	5	6	8	11	16	22
Drawing shallow work up to blank diameter of - - -	inches	8	9	11	15	20	26	8	9	11	15	20	26

These Presses are also built with and without gearing as Single-Action Presses, for deepening, &c. Prices about 10 per cent. less.

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FIG. 447.



DOUBLE ACTION DRAWING PRESS D 4.

Weight, - - - 4700 pounds.

Price, without bolster, - - - \$550.00.

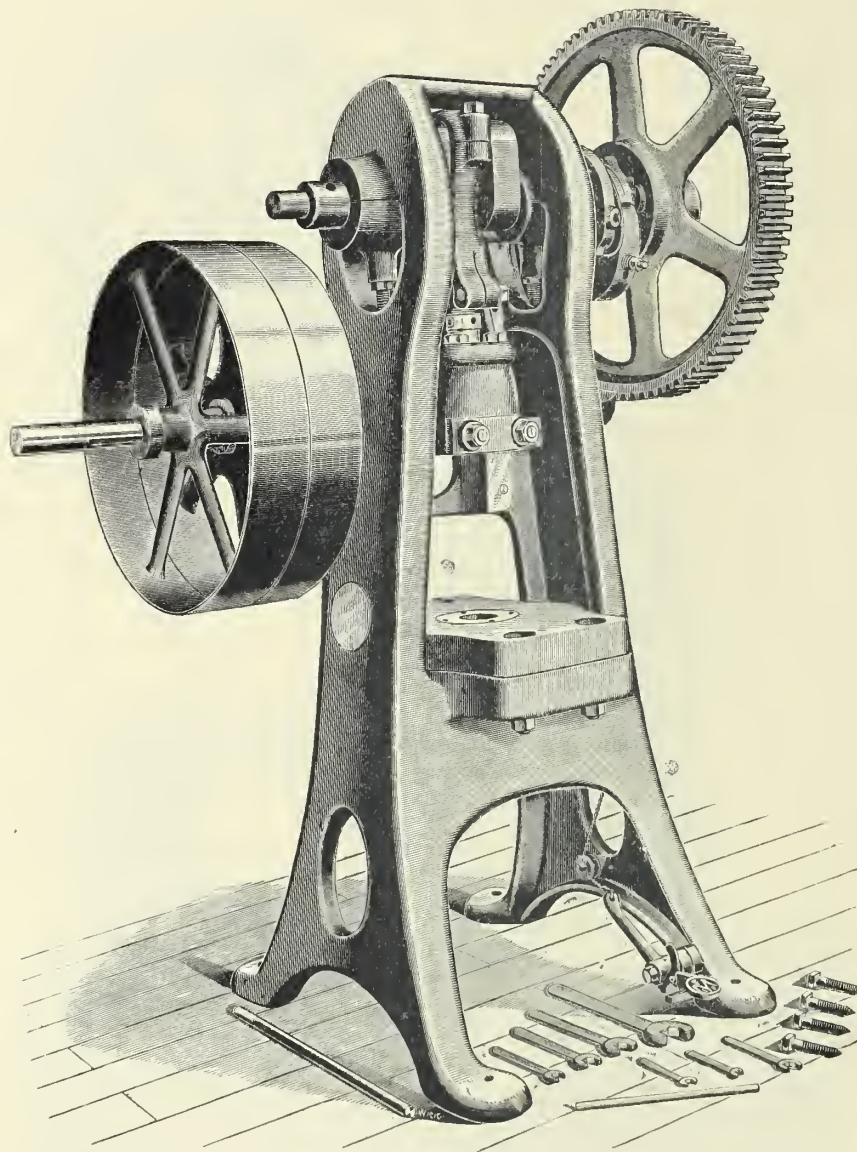
These presses can be used also in inclined position, etc. For description, see previous page.

They are also built with and without gearing as single action presses.

Six sizes of open throat drawing presses, also, six sizes of similar presses with gearing.

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FIG. 448.



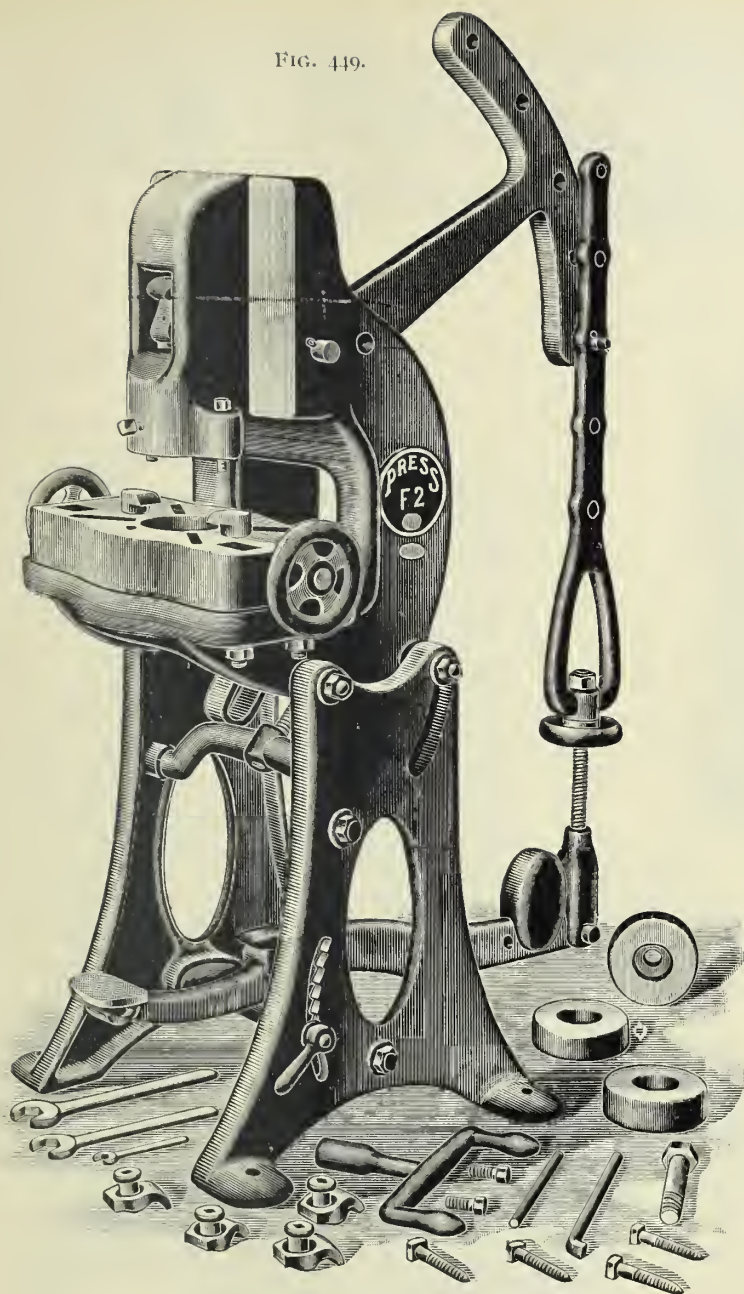
DRAWING PRESS DG 56.

Weight, - - - 12000 pounds.

Price, - - - - \$1400.00.

Six sizes of double action geared drawing presses, also, six sizes of similar presses without gearing. They are also built both with and without gearing, as single action presses, with long strokes for deepening work, etc. For description, see previous pages.

FIG. 449.



This cut also represents four other sizes, same style.

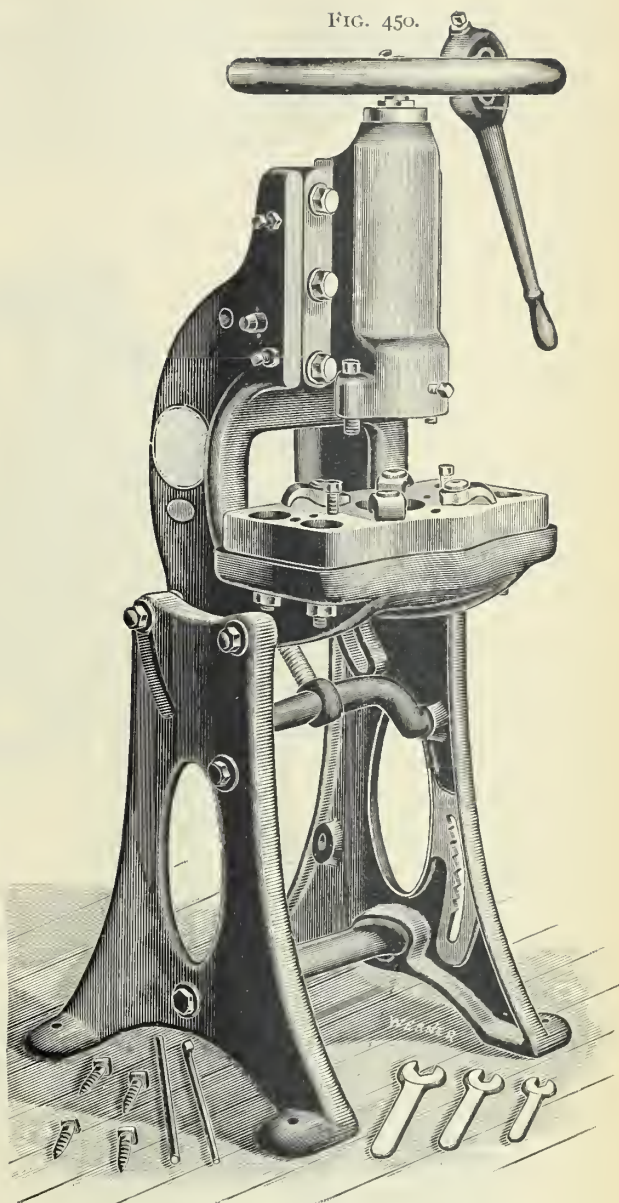
FOOT PRESS F 2.

Weight, - - - - - 825 pounds
Price, - - - \$85. Bolster plate, extra, - - \$10.

PRICES, DIMENSIONS, ETC.—TABLE F 0.

Nominal size	Press	F 1	F 2	F 3	F 4	F 5
Price, without bolster, - - -	\$	65	85	110	150	215
Price, with bolster, - - -	\$	75	95	125	175	250
Weight, about - - -	pounds	550	825	1125	1500	2050
Hole through bed-rectangular, inches		4 x 6	6 x 8	8 x 10	10 x 14	14 x 20
Hole through bed-circular part, inches		6	8	10	14	20
Hole through back-width, inches		9½	11	12½	15	18½
Throat, from center of ram-back, inches		5	6	7	9	12
Height, bed to ram when up, inches		8½	9	9½	10	10½
Stroke of ram, inches		0 to 4	0 to 4	0 to 4	0 to 4	0 to 4
Adjustment of ram, inches		0 to 4	0 to 4	0 to 4	0 to 4	0 to 4
Ratio of leverage from treadle to rams, {		5:1	5:1	5:1	5:1	5:1
		40:1	40:1	40:1	40:1	40:1
Height, floor to top of frame, inches		52	54	56	58	60

FIG. 450.



Five sizes of this style of Press.

Most of the improvements mentioned under Press 273 are embodied in these five sizes of presses.

FOOT AND SCREW PRESSES.

There are a number of special Foot Presses with wiring beds and other attachments for tinware manufacturers' use, &c.

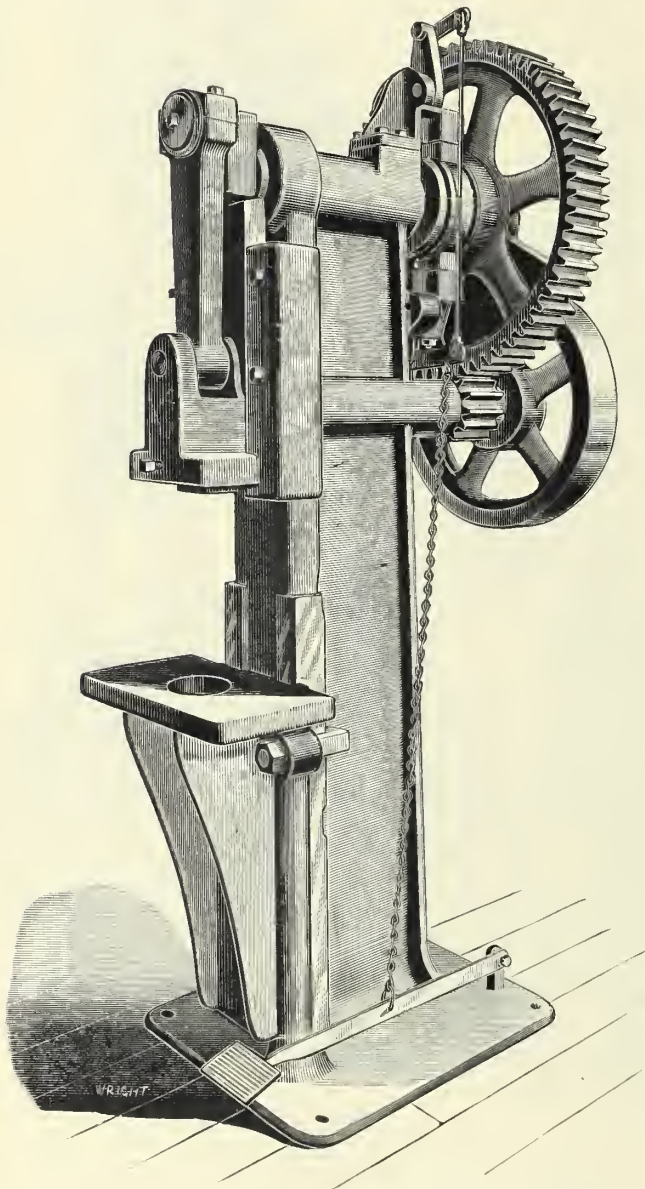
Screw Press F 32.

Price, - - - \$85. Bolster plate, extra, - - \$10.
Weight, - - - - - 800 pounds

These Presses are built from the same patterns as the 5 sizes of Foot Presses, F1, F2, etc., as described, and the general dimensions and prices are about the same as given for Foot Presses in table in left-hand column.

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FIG. 451.



LONG STROKE POWER PRESS, WITH ADJUSTABLE TABLE.

FOR BENDING BICYCLE HANDLE BARS, FORK ENDS, ETC.

THIS press can be used to great advantage for bending handle bars, fork ends, etc., for broaching and sizing of holes, redrawing or reducing, for forcing on cups and cranks and similar operations.

Owing to the great variation of height of the dies used for this work, the table has been made adjustable, this being accomplished by means of a suspension screw with flange nut (shown at the lower end of the table). Two hook bolts clamp it firmly to the body near the top.

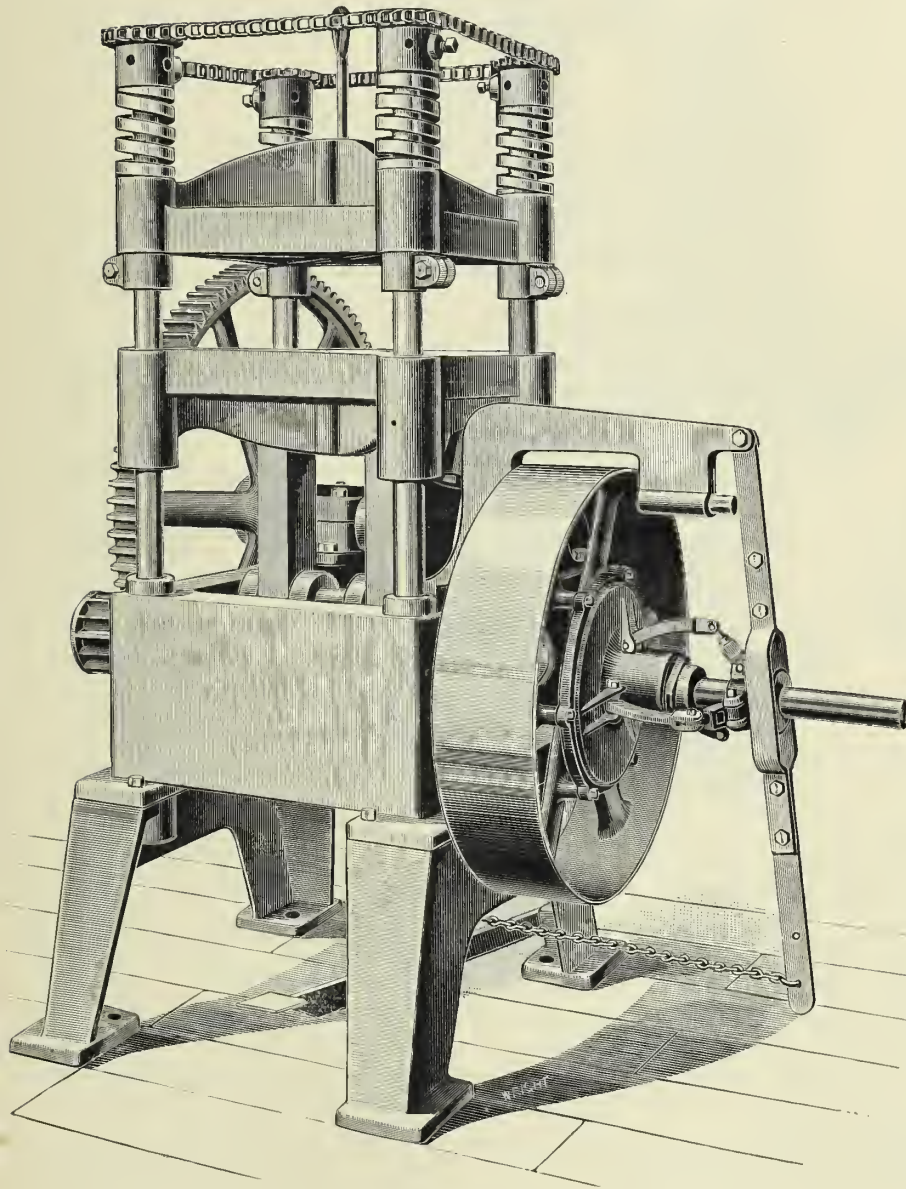
The press is usually provided with an automatic clutch, to stop it at the highest part of stroke. As shown, it has two, for stopping on the up and down stroke, for doing some additional bending by hand, if it should be necessary on some special shapes. Removal of the lower latch will make it stop on the up stroke alone.

SPECIFICATIONS.

Die space, down stroke, highest adjustment of table,	-	-	-	-	4 inches
Adjustment of table,	-	-	-	-	10 inches
Stroke of slide,	-	-	-	-	2 x 6 inches
Distance back from center of slide,	-	-	-	-	5 inches
Ratio of gearing,	-	-	-	-	1 to 5
Diameter of fly-wheel,	-	-	-	-	24 inches
Face,	-	-	-	-	4½ inches
Speed of fly-wheel, per minute,	-	-	-	-	100 to 200 revolutions
Diameter of fly-wheel not geared,	-	-	-	-	36 inches
Height to center of shaft,	-	-	-	-	50 inches
Weight,	-	-	-	-	2600 pounds

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FIG. 452.



POWER SADDLE PRESS.

THE PRESS, as shown in the illustration, is constructed on the toggle motion principle.

The toggles are arranged so that the down stroke of the slide is positive, thus avoiding all sticking in the dies. The press is thrown into operation by the action of the foot on the treadle, which engages a friction clutch. This clutch can be arranged to stop at any part of the stroke by taking the foot off the treadle, or to stop automatically at the end of the stroke.

Strong spiral springs, adjustable to the pressure exerted, are placed at the top of the arch piece, to allow for the variations in the thickness of the material.

The posts are 2 inches in diameter, and made of the best quality of steel.

SPECIFICATIONS.

Motion of slides,	- - - -	6 inches
Clear space between posts, right left,	- - - -	18 inches
" " " front-back,	- - - -	16 inches
Thickness of dies,	- - - -	5 x 7 inches
Size of pulley,	- - - -	28 x 5 inches
Ratio of gearing,	- - - -	1 to 7½ inches
Max. pressure exerted,	- - - -	20-25 tons

Changes can be made to suit requirements.

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FIG. 453.

FRAME NUMBERING AND LETTERING MACHINE.

FOR BICYCLE FRAMES.

THE use of this machine is based on the supposition that frames are numbered twice; once in a plainly visible place and once in a more hidden place.

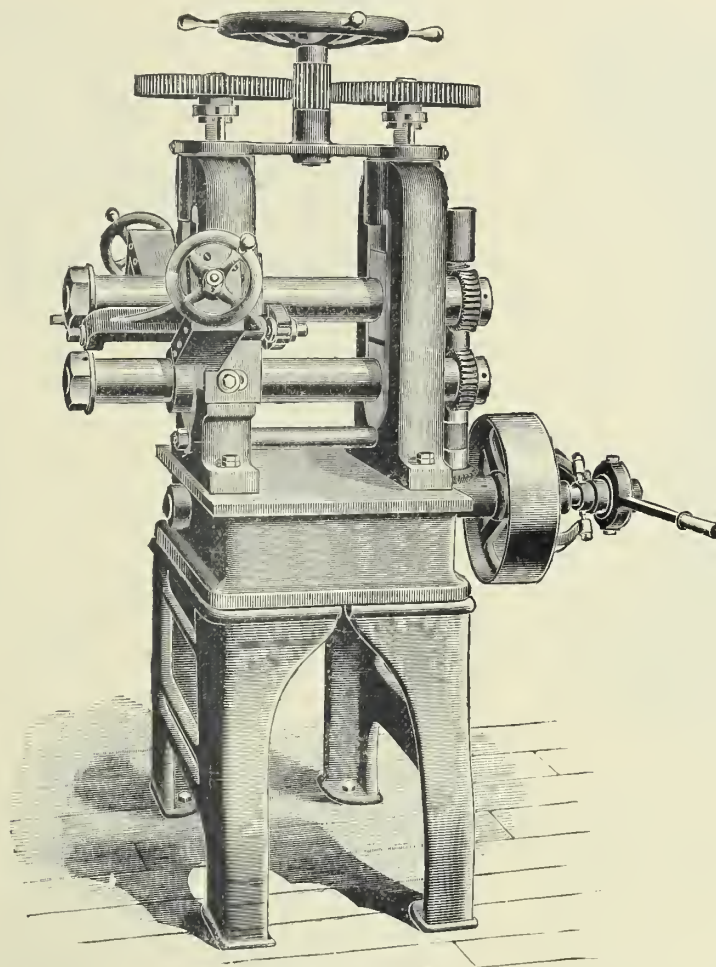
The engraving shows the machine arranged for the latter. The former is stamped around the front post, right above the ball bearing.

A set of figures are carried in a suspended head or turret. This is turned by hand and a respective figure is brought into line. By depressing the foot the impression is made. With the fixture, as shown in the engraving, the spacing is done likewise (for stamping in a straight line). Another fixture is furnished for numbering the front post (in a circle). In this case the turret is locked in place by a set screw and the indexing is done by a notched segment on the arbor, supporting the front post.

The work done by the machine is neater than that done by hand and hammer, the spacing being uniform and the impressions being alike. It also constitutes a large saving of time, as it dispenses with picking up single figures.

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FIG 455.



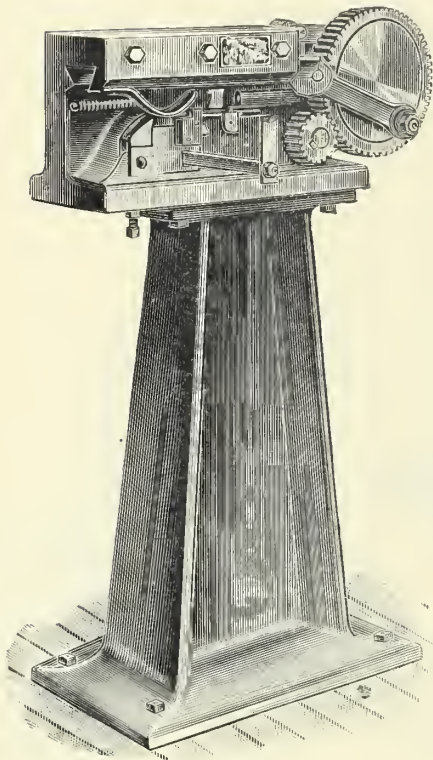
BICYCLE RIM ROLLING MACHINE.

THE cut herewith represents our latest improved machine for rolling bicycle mud guards, tires, or rims. The machine has been carefully designed and constructed to meet all the requirements necessary for rolling bicycle tires, or similar work. The machine is made in a first-class manner throughout. The spindles are made of hammered steel and are amply strong. They are designed to take one roll, or three rolls, 6 inches diameter, 2 inches thick. The spindles are driven by a steel worm and copper and tin worm-gears. The driving power is 32 to 1, and the machine can be run with a very narrow or light belt. The spindles can be started and stopped in an instant, by means of hand-lever shown, which connects with friction driving pulley, at right of cut. The guide rolls have an adjustment in the frame, and an angle adjustment toward the center of rolls or arbors. The longitudinal adjustment of the guide roll slides is obtained by collar screw, shown in cut, while the angle adjustment is made by means of small hand wheels, as shown. The adjustment of top arbor is obtained by means of large hand wheel on top of machine, the hand wheel being connected with pinion, which runs into gears fastened to lifter screw.

Weight of the machine, 1950 pounds.

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FIG. 456.



BICYCLE-SPOKE THREADING MACHINE.

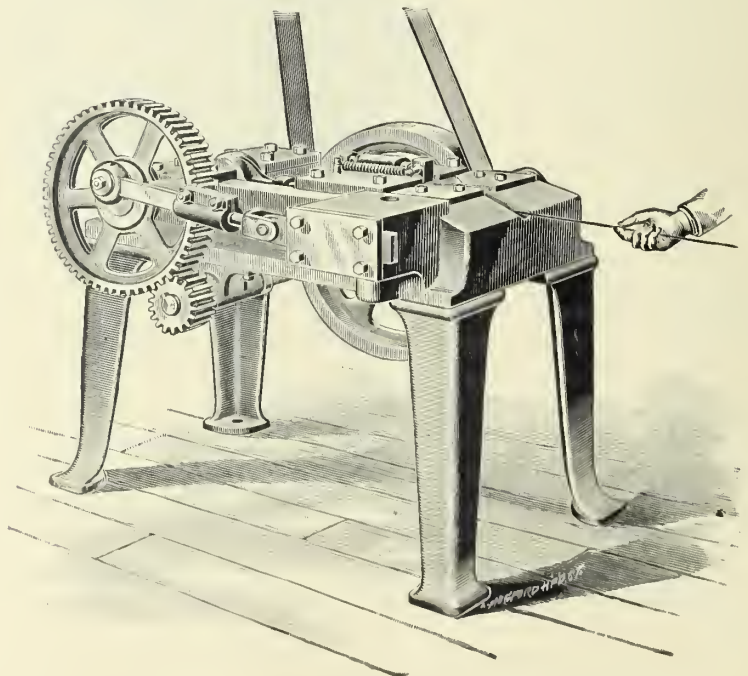
THE wires are rolled between grooved dies in the method of threading shown in the illustration; the thread is partially raised by this rolling operation, and the diameter of the thread is slightly greater than the diameter of the plain wire. Very accurate and nice work can be produced rapidly and economically by this process.

The machine is designed specially for threading bicycle spokes, which, for convenience in handling, are fed horizontally.

BICYCLE-SPOKE HEADING MACHINE.

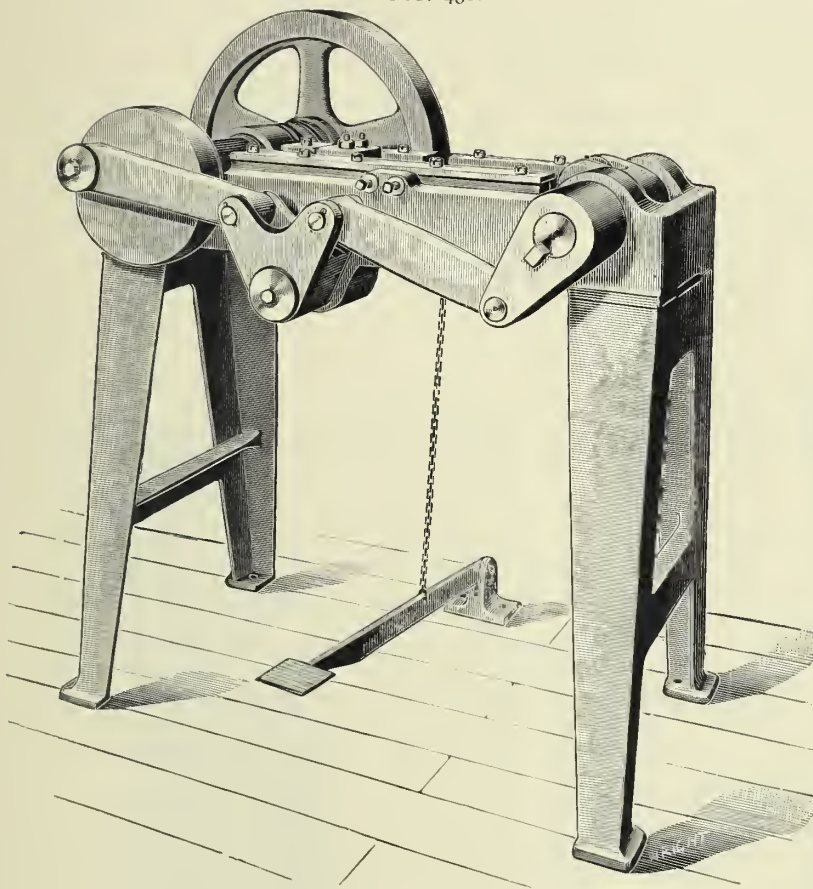
THE illustration represents our special, single stroke, open die header, for heading wire to 3-16 inch in diameter when the wires are too long to be fed automatically. This form of machine is designed especially for upsetting or heading bicycle spokes. The dies are readily accessible, and are so exposed as to enable the wires to be easily and rapidly placed; the machine is without clutch, is geared 4 to 1, and the speed depends upon the operator's ability to feed the wires; say about 40 or 45 per minute. The fly wheel is 20 inches in diameter and $4\frac{1}{4}$ inches face.

FIG. 457.



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FIG. 458.



COMBINED SPOKE HEADER AND BENDER.

FOR BICYCLE SPOKES.

THIS MACHINE will do in one operation, what has been done in two heretofore, viz.: bend and head a spoke, constituting a saving of time of 50% and dispensing with the cost of a bending machine.

The bending being done first, enables us to make a perfectly round curve in the corner of the same or even an enlarged section, dispensing entirely with the unavoidable contraction if the bending is done after the heading.

The way of operating this machine does not differ from other headers, having the same capacity.

The frame is a solid, straight sided casting, all bearings are large, and the adjustments are convenient and exact. The fly-wheel is engaged by means of an automatic clutch, worked by a treadle (as on a power press). The clamping and bending slide is operated by means of a toggle lever system, insuring (in comparison with cams) an easy running and lasting machine. Such parts of the die as are subject to wear, consist of inserted round tool steel, and are, consequently, quickly and cheaply repaired.

SPECIFICATIONS.

Weight, complete,	- - -	950 pounds
Size of fly-wheel,	- - -	22 x 3½ inches
Weight of fly-wheel,	- - -	175 pounds
Number of revolutions per minute,	- - -	90

LARGE RECIPROCATING SCREW-THREADING MACHINE.

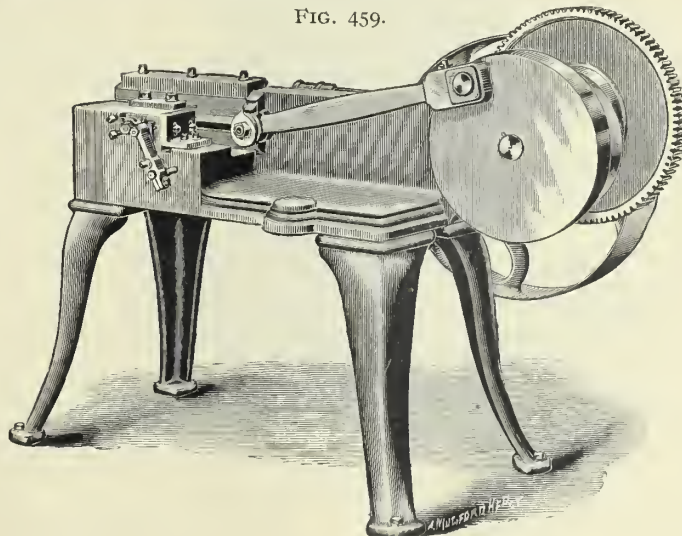
This Machine will thread ends of wire or screw blanks $\frac{5}{8}$ inch in diameter and 2 inches long, or will thread with special dies $2\frac{3}{4}$ inches long. The dies are 6 inches in length. The machine has quick return motion and is back-geared $4\frac{1}{2}$ to 1, and is driven by pulley 24 inches in diameter and $4\frac{1}{2}$ inch face.

Price includes one set of dies and hand feeding mechanism.

Weight, 1500 pounds.

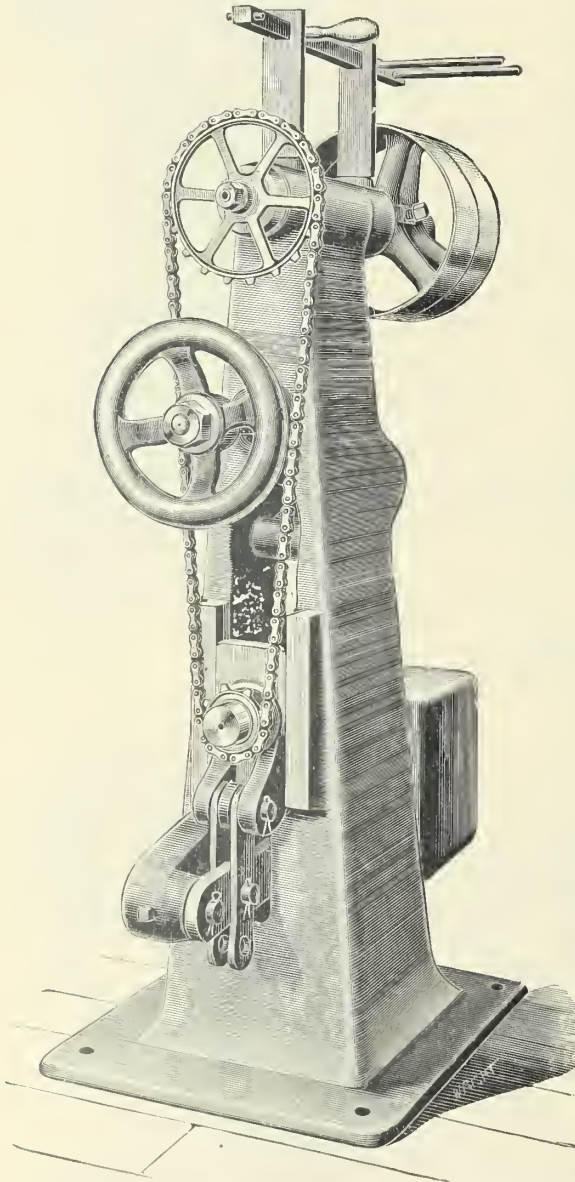
Price, - - - \$350.00

FIG. 459.



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FIG. 460.



CHAIN STRETCHING AND TESTING MACHINE.

FOR BICYCLE CHAINS.

THIS MACHINE is designed for stretching and testing bicycle chains. The chains are soaked in oil and run from 10 to 15 minutes under a load of 500 to 700 pounds. The conditions to which the chain is subjected to are the same as when in actual use.

The machine is simple and convenient to handle. The tension can be regulated by shifting the weights. Chains of various lengths can be accommodated by a series of holes in the connecting links, between levers and slide.

They are one of the most necessary tools for bicycle factories.

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FIG. 461.

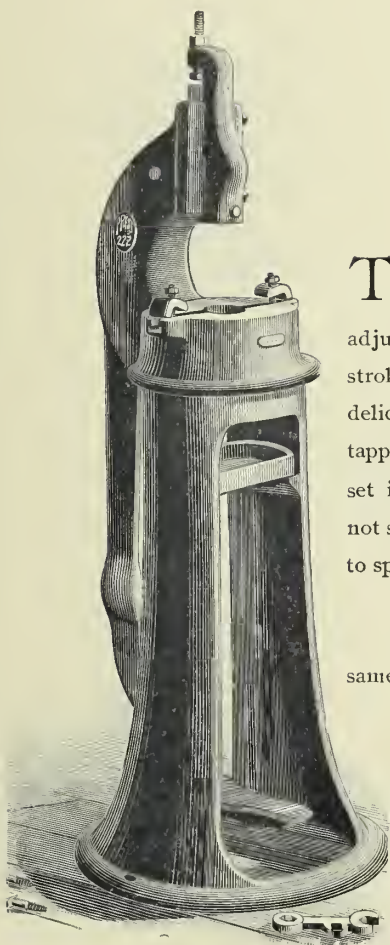
No. F-162 PENDULUM FOOT PRESS.

THIS PRESS is especially adapted to all kinds of light punching and embossing. It is built very solid and compact, with accurate "dove-tail" ram provided with adjustment for wear, thus fitting it for various irregular-shaped work. The adjustment of stroke is regulated by a screw and lock-nut in top of ram, thus giving a positive stop for delicate work ; and it has rubber bumpers in treadle for return stroke. The ram is usually tapped for screwed shank dies 1 inch diameter, 8 threads to the inch, and clamps with bolts set in slots are provided so that various sizes of dies may be held. A chuck and bushing, not shown, can be furnished, if desired, at slight extra cost. The ram can be bored or tapped to special sizes if required.

Weight, complete, with pedestal, 260 pounds.

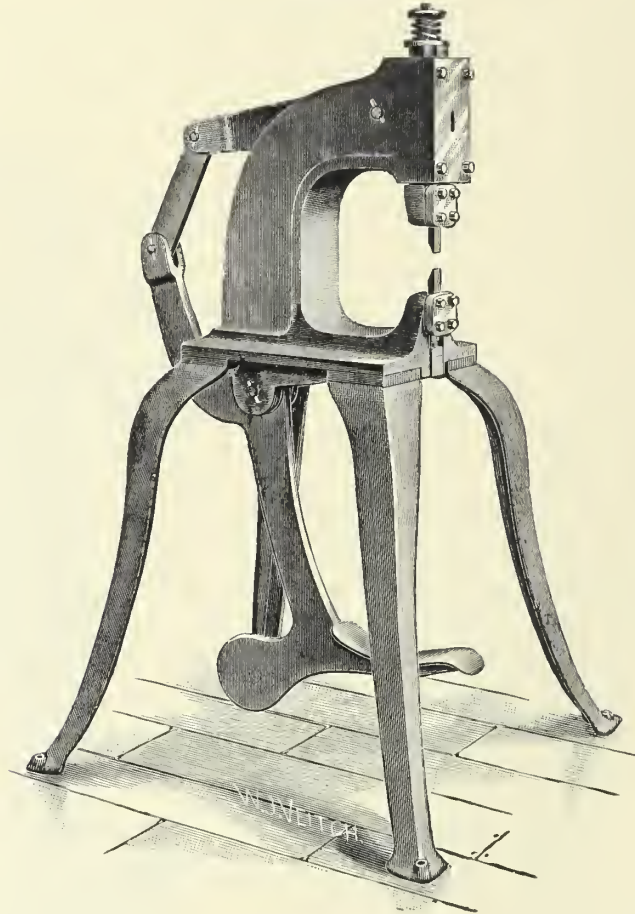
We also furnish the above press without pedestal for mounting on bench. This is the same press in every particular, excepting pedestal. Weight, 150 pounds.

In writing or ordering, specify which style is wanted.



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FIG. 462.



SPRUE CUTTER.

THIS MACHINE is commonly known as a Sprue Cutter, being designed for use in brass foundries in cutting castings from the gates. It is operated by foot power, and particular attention has been given the design and general construction to make it a strong, durable machine, capable of withstanding the severe usage to which a tool of this kind is usually subjected.

The dimensions are as follows: depth of throat from cutting edge, $10\frac{1}{8}$ inches; space up and down back of cutting tools, $12\frac{1}{2}$ inches; height over all, about 5 feet; shipping weight, 530 pounds; cutting capacity is the equivalent of $\frac{1}{2}$ inch square common yellow brass. The cutting tools are made of the best cast steel, $\frac{1}{2} \times 1$ inch, ground to the proper taper for cutting, and carefully tempered.

For general foundry work this machine cannot be excelled, as the scores of foundrymen who have them in use will attest, and the price, which is an important factor at this time, is so low that no foundryman who is awake to his own interests will attempt to continue in the old way with cold-chisel and hammer when so good and serviceable a machine can be bought for so little money.

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ELASTIC ROTARY-BLOW RIVETING MACHINES.

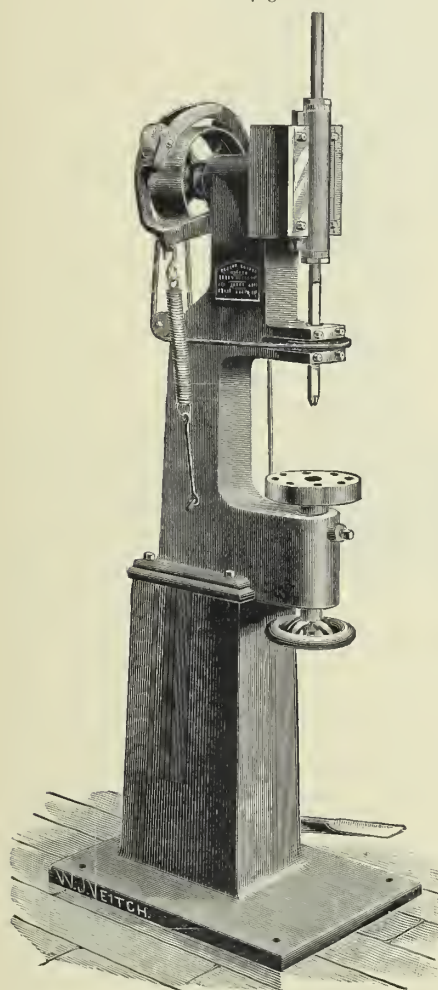
THESE cuts represent our Elastic Rotary-Blow Riveting Machines, riveting together various articles of hardware, bicycle chains, and every class of work in the manufacture of which riveting is required. The most important feature of these machines is in the combination and working of the cylinder and hammer-rod. The hammer-rod,

suspended by springs and confined air within the cylinder, partakes of its reciprocating motion, and produces sharp, quick blows, which, with its rotating motion, enables the machines to perform the work almost instantly. The blows are rendered elastic by the springs in connection with the air cushions, and the force can be regulated at the will of the operator by more or less pressure applied to the treadle at the right of the machine. The yoke, or idler frame, to which the treadle is attached is self-acting, and the moment pressure is removed the blows cease and the work can be withdrawn.

The style A represents the form of machine most generally used, and is adapted to all ordinary work, but in many classes of work where a vise or other special attachments are required for holding the work while being riveted, the style B machine gives more range and is more suitable. The style A machine has an adjustable, round top anvil, to which such holding fixtures as may be found necessary can be attached—convenient holes being drilled through the top to admit of fastening the holding fixtures at almost any point. The style B machine has a vertical anvil which is adjustable as to height, and can also be detached from the machine if desired.

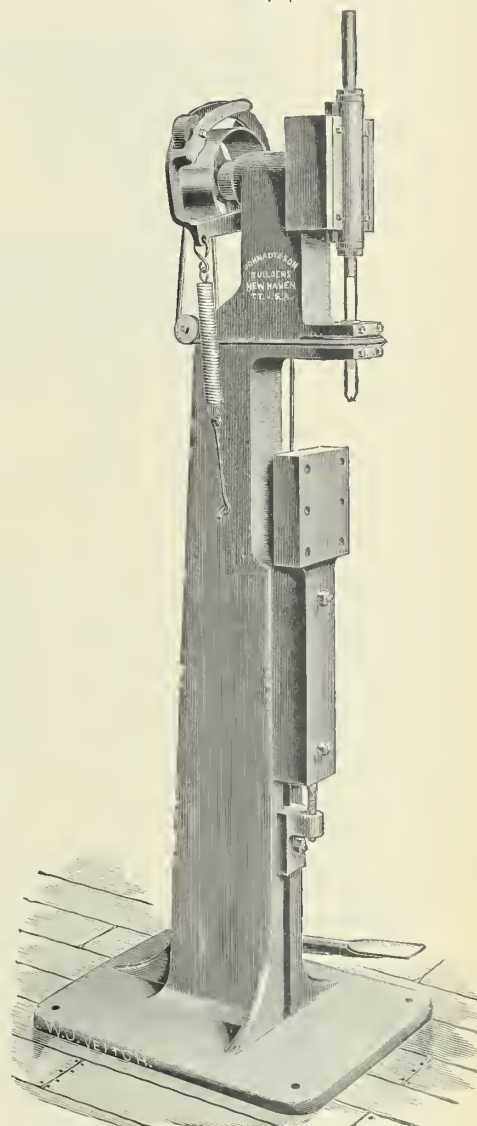
The style C machine embodies the upper working parts of the machines described above, but its frame is made with a long horizontal foot, which can be attached to the top of a bench of suitable height and strength, or if preferred may be suspended by a frame work from the ceiling, and in either way will admit of riveting on the surface of work of large diameter, or on large awkward shapes that could not be handled by either of the other machines.

FIG. 463.



STYLE A.

FIG. 464.



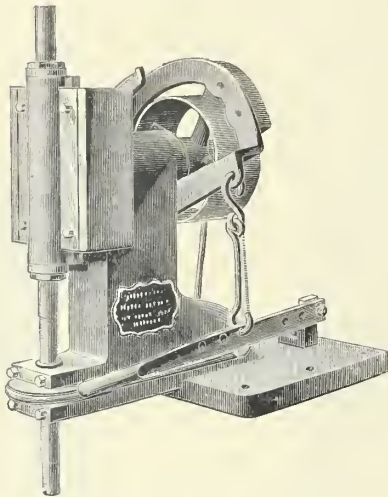
STYLE B.

These machines are all made in six sizes, viz: $\frac{1}{16}$ in., $\frac{1}{8}$ in., $\frac{3}{16}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in., and $\frac{1}{2}$ in., each machine being capable of working many smaller sizes of rivets than that indicated as its size.

SIZE OF MACHINE.	STYLES A AND B.	STYLE C.	COUNTERSHAFTS.
$\frac{1}{2}$ inch,	\$195.00	\$135.00	\$18.00
$\frac{3}{8}$ inch,	170.00	115.00	16.00
$\frac{1}{4}$ inch,	135.00	95.00	14.00
$\frac{3}{16}$ inch,	120.00	90.00	14.00
$\frac{1}{8}$ inch,	110.00	80.00	13.00
$\frac{1}{16}$ inch,	95.00	75.00	12.00

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FIG. 465.

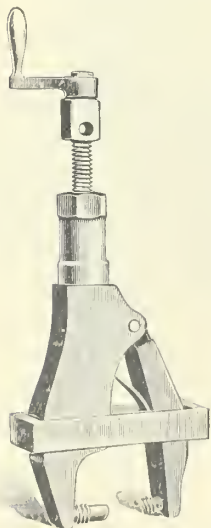


STYLE C, ELASTIC ROTARY BLOW RIVETING MACHINE.

This machine embodies the upper working parts of the Style A machine described below, but its frame is made with a long horizontal foot, which can be attached to the top of a bench of suitable height and strength, or if preferred may be suspended by a frame work from the ceiling, and in either way will admit of riveting on the surface of work of large diameter, or on large awkward shapes that could not be handled by either of the other machines.

These machines are made in six sizes, viz: $\frac{1}{16}$ inch, $\frac{1}{8}$ inch, $\frac{3}{16}$ inch, $\frac{1}{4}$ inch, $\frac{3}{8}$ inch, and $\frac{1}{2}$ inch, each machine being capable of working many smaller sizes of rivets than that indicated as its size.

FIG. 467.

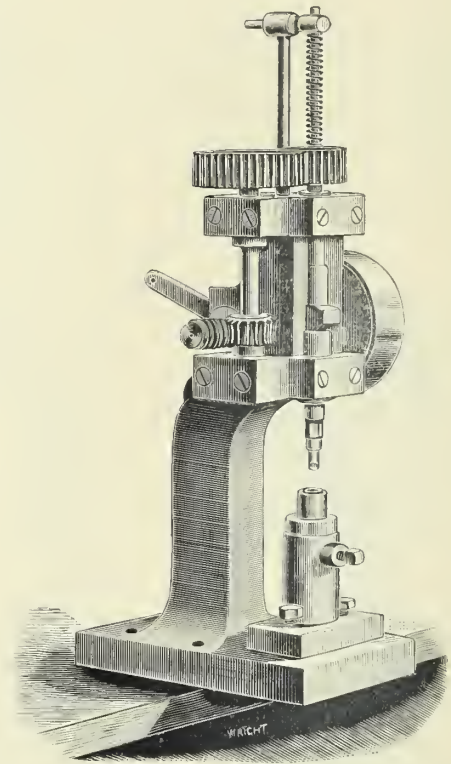


SMALL HAND POWER HYDRAULIC RIVETER.

This tool was first designed for riveting the connections in the commutators of large dynamos, in which cases the ends of the jaws and riveting tools had each less than $\frac{3}{4}$ inch of room in which to work. The one from which this cut was made, was used on the Chicago Elevated Railroad with great success in heading the copper bonding wires in the holes in the rails. It had a power of about 15 tons, a stroke of $\frac{5}{8}$ inch and a depth of jaw of $3\frac{1}{8}$ inch to center of rivet.

Weight, as shown, 35 pounds
Price, - - - \$70.00

FIG. 466.



RIVETING MACHINE.

Light, strong, rapid, compact, occupying a space 10 inches square; smooth running, all gears being cut; calculated for rivets $\frac{1}{8}$ inch diameter, or less, to $2\frac{1}{2}$ inches in length.

Makes any shaped head desired—flat, oval or corrugated.

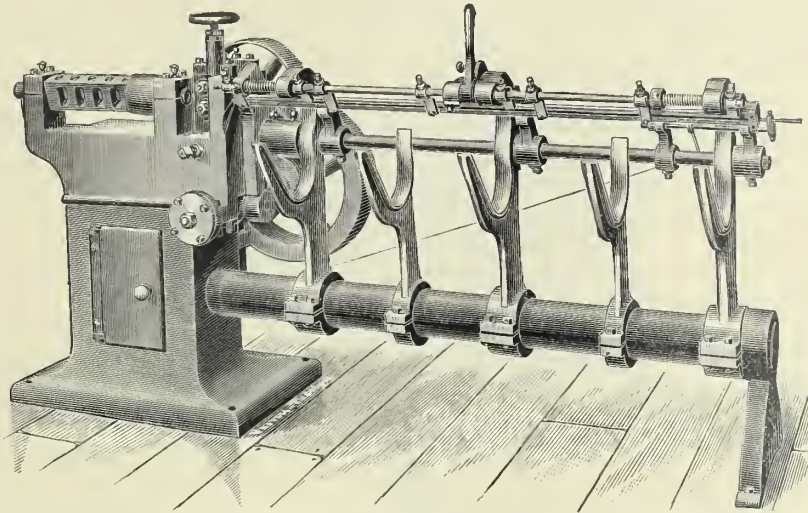
The header having a rotary motion, this machine is particularly adapted to work where a swing joint is wanted, as it makes a perfect head, leaving the body of the rivet a good fit, and free, not upsetting the shank, as is often the case in ordinary press riveting.

Adapted to lock work, sewing machines, typewriter parts, electrical supplies, etc.

Price, - - - - - \$75.00
No. 2 machine for rivets $\frac{1}{4}$ inch diameter, 90.00

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FIG. 468.



AUTOMATIC WIRE-STRAIGHTENING AND CUTTING MACHINE.

LONG CUT.

THE LONG CUT MACHINE, as its name implies, is designed for straightening wire and cutting it into long lengths. It can also be used for cutting any length shorter than the extreme length for which it is arranged, but is not recommended for continuous use in cutting short pieces. This machine is constructed upon the same principle as the "medium cut" which is described on another page, having the balance wheel and clutch attachment, and is also provided with a grooved guide bar and adjustable gauge to insure accurate lengths. Forked holders are employed in this machine to catch the wire as it is cut off and dropped from the groove in the guide bar. These holders are mounted upon a piece of wrought iron pipe which is fastened into the base of the machine at one end and at the other is supported by a floor stand. Some of the holders are carried up so as to support the shaft, guide bar and other necessary parts, thus rendering great security and strength to the various parts of the cutting extension.

The above engraving represents a machine with guide bar arranged to cut lengths of 4 feet and shorter, but we can furnish the machines to cut almost any length desired.

This machine is built in the following sizes, viz : $\frac{1}{16}$ inch, $\frac{1}{8}$ inch, $\frac{3}{16}$ inch, $\frac{1}{4}$ inch, $\frac{3}{8}$ inch, and $\frac{1}{2}$ inch ; each machine being capable of working many smaller diameters of wire than that indicated as its size, by having the necessary feeding and cutting tools.

The prices quoted herewith include with each machine a suitable reel for holding the coils of wire, a full set of dies for the straightener arbor (either white iron, gun metal or Babbitt, as the wire to be worked may require), also one set of feeding and cutting tools which can be arranged to work from two to three consecutive sizes of wire within the capacity of the machine.

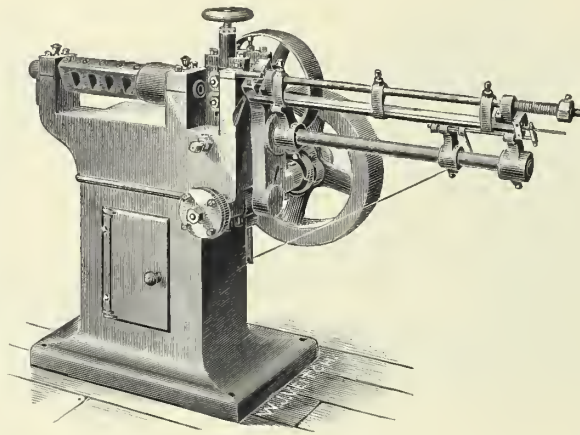
SIZE.	2 feet and shorter cut.	3 feet and shorter cut.	4 feet and shorter cut.	5 feet and shorter cut.	6 feet and shorter cut.	7 feet and shorter cut.	8 feet and shorter cut.	9 feet and shorter cut.	10 feet and shorter cut.	For each additional foot add.	Countershaft
$\frac{1}{16}$ inch.	\$170.00	\$182.00	\$193.50								\$17 00
$\frac{1}{8}$ inch.	170.00	182.00	193.50	\$204.50	\$215.00	\$225.00	\$234.50	\$243.50	\$252.00	\$8.00	17 00
$\frac{3}{16}$ inch.	190.00	203.00	215.50	227.50	239.00	250.00	260.50	270.50	280.00	9.00	19 00
$\frac{1}{4}$ inch.		230.00	244.00	257.50	270.50	283.00	295.00	306.50	317.50	10.00	20 00
$\frac{3}{8}$ inch.		295.00	310.00	324.50	338.50	352.00	365.00	377.50	389.50	12.00	26 00
$\frac{1}{2}$ inch.			500.00	518.50	536.50	554.00	571.00	587.50	603.50	16.00	34 00

In writing for further particulars concerning these machines, be sure to specify the sizes of wire required to be straightened and lengths to be cut, both the longest and shortest, so that we can recommend the most suitable machine for the work. When sizes of wire are expressed by number, give name of wire gauge used.

In ordering, always specify the sizes of wire for which the machine is required, also the kind of wire used, so that we can send the proper sizes of feeding and cutting tools, and dies for the straightener arbor made of the most suitable metal.

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FIG. 469.



AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE.

MEDIUM CUT.

THE MEDIUM Cut machine is designed to straighten wire, and to cut it up automatically into lengths of from 1 to 3 feet and shorter, according to the size of the machine.

In this machine, a shaft, about as long as the machine is intended to cut, is attached to the fulcrum of the cutting off lever and rotates with each movement of the lever. The guide bar, situated above, and forward of this shaft, is connected with both the shaft and cutting off lever and has a groove running its entire length, in which is located a movable adjustable gauge, the gauge being connected at its outer end by a wire to a clutch on the cam shaft. When the straightened wire strikes this gauge, as it passes through the groove from the bushing die, it throws in the clutch, and the cutting off lever works instantly; at the same time the rotary motion of the shaft throws the cover off the groove in the guide bar, by means of arms attached to it, and the cut wire drops out.

If straightened wire is run out too far without support, the end will drop out of line more or less according to the size of the wire, and if fed out by power against a stop gauge, it will either bend or spring before it can be cut off and cannot, therefore, be cut into accurate lengths. The grooved guide bar with cover and gauge entirely overcome these difficulties, and is one of the important features of this machine.

The Medium Cut machine is built in the following sizes, viz.: $\frac{1}{16}$, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{2}$ inch, each machine being capable of working many smaller diameters of wire than that indicated as its size, by having the necessary feeding and cutting tools.

The prices quoted herewith include with each machine a suitable reel for holding the coils of wire, a full set of dies for the straightener arbor (either white iron, gun metal or Babbitt, as the wire to be worked may require), also one set of feeding and cutting tools which can be arranged to work from two to three consecutive sizes of wire within the capacity of the machine.

SIZE.	$\frac{1}{16}$ INCH. To cut lengths of 12 inches and shorter.	$\frac{1}{8}$ INCH. To cut lengths of 16 inches and shorter.	$\frac{3}{16}$ INCH. To cut lengths of 20 inches and shorter.	$\frac{1}{4}$ INCH. To cut lengths of 24 inches and shorter.	$\frac{3}{8}$ INCH. To cut lengths of 30 inches and shorter.	$\frac{1}{2}$ INCH. To cut lengths of 36 inches and shorter.
Countershaft.	\$135.00 17.00	\$135.00 17.00	\$160.00 19.00	\$185.00 20.00	\$260.00 26.00	\$375.00 34.00

In writing for further particulars concerning these machines, be sure to specify the sizes of wire required to be straightened and lengths to be cut, both the longest and shortest, so that we can recommend the most suitable machine for the work. When sizes of wire are expressed by number, give name of wire gauge used.

In ordering, always specify the sizes and kinds of wire for which the machine is required, so that we can send the feeding and cutting tools made for the proper sizes, and dies for the straightener arbor made of the most suitable metal.

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A detailed technical illustration of a mechanical device, likely a press or a pump. The device features a large, horizontal cylindrical body with a textured surface, possibly indicating a piston or a plunger. A vertical rod extends from the top of the cylinder, passing through a series of components including a handle with a circular grip and a large, circular flywheel or gear. A spherical weight hangs from the bottom of the vertical rod. The entire assembly is mounted on a sturdy, cylindrical base. The illustration is rendered in a classic, engraved style with fine lines and shading to indicate depth and texture.

COMBINED HAND AND POWER WIRE STRAIGHTENING AND CUTTING MACHINES.

THE COMBINED Hand and Power Wire-Straightening and Cutting Machine is a combination of a rotary wire-straightener and feeding rolls run by power, and a lever for cutting by hand. It is designed for straightening wire and cutting it into short pieces, or into long lengths that are to be cut again.

Where the size of wire and length to be cut is such as will not spring or drop out of line, it can be cut accurately by means of the gauge, but long lengths can only be cut where exactness is not essential. For cutting long lengths the machine can be used in connection with a trough in which the wires may be allowed to feed out to the required length.

Where a large quantity of wire is to be handled, this machine is not so well adapted as the "medium" or "long cut" machines described on subsequent pages, although an experienced operator can manipulate it quite rapidly.

This machine is built in four sizes, viz.: $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$ and $\frac{3}{8}$ inch, each machine being capable of working many sizes of wire by having the necessary feeding and cutting tools.

The prices quoted herewith include with each machine a suitable reel for holding the coils of wire, a full set of dies for the straightener arbor (either white iron, gun metal or Babbitt, as the kind of wire to be worked may require), and one set of feeding and cutting tools which we can arrange to work for two to three consecutive sizes of wire within the capacity of the machine.

In sending orders or further inquiries be sure to specify the sizes and kinds of wire for which the machine is required, and when the sizes are expressed in numbers give name of wire gauge used.

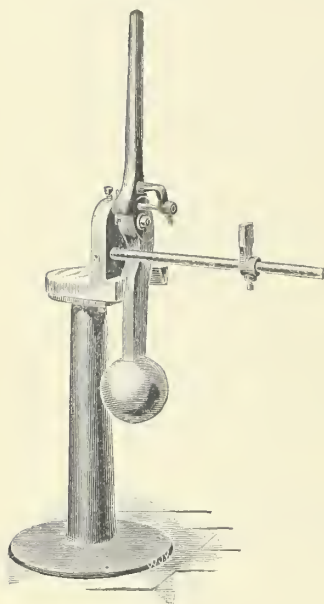
The following prices are net, f. o. b., at New Haven, Conn., and are subject to change without notice :

SIZES.										COUNTERSHAFTS.
$\frac{1}{8}$	-	-	-	-	-	-	-	-	\$60.00	- - - - - \$16.00
$\frac{3}{16}$	-	-	-	-	-	-	-	-	70.00	- - - - - 16.50
$\frac{1}{4}$	-	-	-	-	-	-	-	-	80.00	- - - - - 17.00
$\frac{3}{8}$	-	-	-	-	-	-	-	-	110.00	- - - - - 22.00

We are prepared to build machines to special order for working $\frac{7}{16}$ and $\frac{1}{2}$ inch wire, and shall be pleased to furnish description and prices upon application.

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FIG. 471.



HAND WIRE-CUTTER.

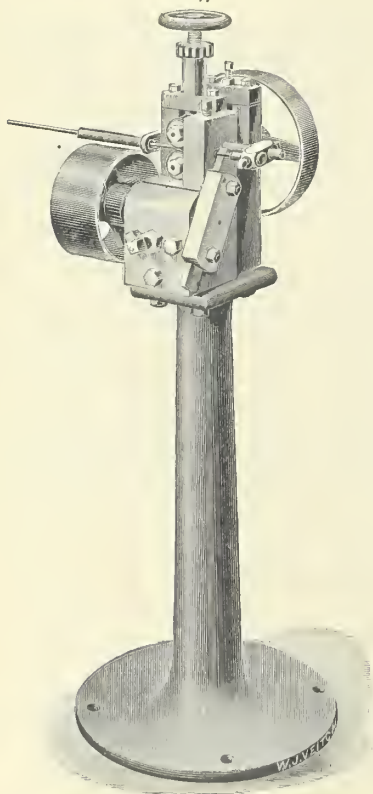
THIS MACHINE is offered as a practical and serviceable tool for cutting up wire or rod that has been previously straightened. It is not a toy like most of the so-called hand wire-cutters on the market, but a strong, well-made machine calculated to meet the wants of those who occasionally desire to cut up a small quantity of wire, or for use in small shops where the work is largely done by hand power.

This machine is made in three sizes, for wire of $\frac{1}{8}$ inch, $\frac{1}{4}$ inch and $\frac{3}{8}$ inch diameter.

The cut shows a round weight at the lower end of the cutting lever; this is furnished with the $\frac{1}{4}$ inch, and $\frac{3}{8}$ inch sizes only.

$\frac{1}{8}$ inch size (cuts wire $\frac{1}{8}$ inch and smaller),	- - - - -	\$15.00
$\frac{1}{4}$ inch size (cuts wire $\frac{1}{4}$ inch and smaller),	- - - - -	20.00
$\frac{3}{8}$ inch size (cuts wire $\frac{3}{8}$ inch and smaller),	- - - - -	25.00
New size, $\frac{3}{16}$ inch size (cuts wire $\frac{3}{16}$ inch and smaller),	- - - - -	17.50

FIG. 472.



ROTARY WIRE-CUTTER.

THIS MACHINE is run by belt power and is designed for cutting wire into short pieces, such as rivets used in the manufacture of cutlery and kindred articles. In this machine a pair of feeding rolls are arranged to take the wire direct from the coil, feed it out through a bushing die in the face of the machine and against an adjustable gauge, where it is cut off by rapidly revolving cutters. There is no straightener attached to this machine, for where wire is cut in such short lengths the natural curve is almost imperceptible, and straightening the wire is therefore unnecessary.

This machine is made only in one size, and will cut wire of $\frac{1}{8}$ inch and smaller diameter into length of 1 inch, and shorter, at the rate of 600 lengths per minute.

Price with one set of feeding rolls,	- - - - -	\$60.00
Countershaft,	- - - - -	15.00

PRENTISS TOOL & SUPPLY CO.

FIG. 474.

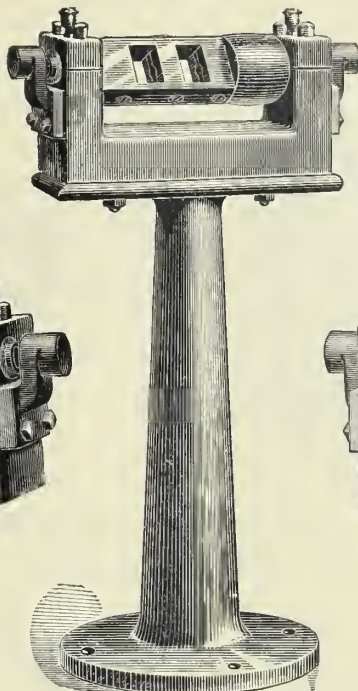


FIG. 473.

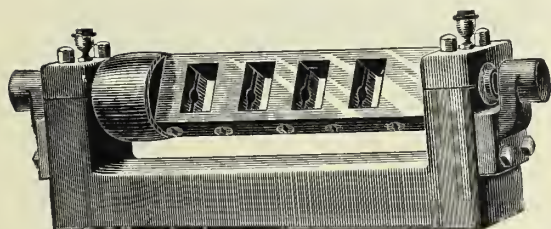
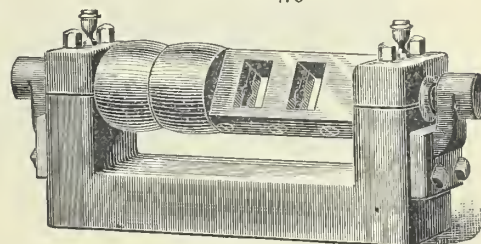


FIG. 475.



This cut shows manner in which we mount the Rotary Wire Straighteners upon iron pillar when ordered.

ROTARY WIRE STRAIGHTENERS.

ON this page will be found cuts representing the sizes and styles of rotary wire-straighteners used for straightening wire of 1 inch diameter and smaller; the machines being made in the following sizes, viz.: 1-32 inch, 1-16 inch, $\frac{1}{8}$ inch, 3-16 inch, $\frac{1}{4}$ inch, $\frac{1}{2}$ inch, $\frac{3}{4}$ inch, and 1 inch, each machine being capable of straightening the diameter of wire indicated as its size and many diameters smaller. The 1-32 inch, 1-16 inch, and $\frac{1}{8}$ inch sizes are made only with five dies and tight pulley. The 3-16 inch, $\frac{1}{4}$ inch, 5-16 inch, and $\frac{3}{8}$ inch sizes are made with both three and five dies, and with tight, and tight and loose pulleys. The $\frac{1}{2}$ inch, $\frac{3}{4}$ inch, and $\frac{1}{4}$ inch sizes are made with both three and five dies, but with tight pulley only. The 1 inch size is made with three dies and tight pulley only.

The machines, from the 1-32 inch to the $\frac{1}{2}$ inch size inclusive, can be bolted to the top of a bench, or we mount them upon iron pillars when so ordered. The $\frac{3}{4}$ inch and $\frac{1}{4}$ inch sizes can also be bolted to the top of a bench if preferred, but owing to their weight they are usually ordered mounted upon legs (of which we have a very strong pattern similar to that used on ordinary engine lathes. The 1 inch size is made with a hollow iron base for bolting to the floor.

The oscillating rotary straightener, a cut of which is also shown, is designed to be used in connection with automatic wire forming machines which have intermittent feed, the straightening arbor being arranged to oscillate, and thus prevent the dies from injuring the wire while the feed is stopped. The oscillating straighteners are made in six sizes, viz.: 1-16 inch, $\frac{1}{8}$ inch, 3-16 inch, $\frac{1}{4}$ inch, 5-16 inch, and $\frac{3}{8}$ inch. The 1-16 inch and $\frac{1}{8}$ inch sizes being made with five dies only, while the four larger sizes are made with both three and five dies.

SIZE.	3 Dies. Tight Pulley.	3 Dies. Loose Pulley.	5 Dies. Tight Pulley.	5 Dies. Loose Pulley.	Iron Pillar. Extra.	Legs. Extra.
$\frac{1}{32}$ inch, - - -			\$14.00		\$4.00	
$\frac{1}{16}$ inch, - - -			14.00		4.00	
$\frac{1}{8}$ inch, - - -			14.00		5.00	
$\frac{3}{16}$ inch, - - -	\$15.00	\$17.00	17.00	\$19.00	6.00	
$\frac{1}{4}$ inch, - - -	18.00	21.00	21.00	24.00	7.00	
$\frac{5}{16}$ inch, - - -	21.00	24.00	24.00	28.00	8.00	
$\frac{3}{8}$ inch, - - -	24.00	28.00	28.00	32.00	10.00	
$\frac{1}{2}$ inch, - - -	35.00	42.00	42.00	49.00	15.00	
$\frac{3}{4}$ inch, - - -	80.00		100.00			\$20.00
$\frac{1}{2}$ inch, - - -	100.00		120.00			20.00
1 inch, - - -	200.00					

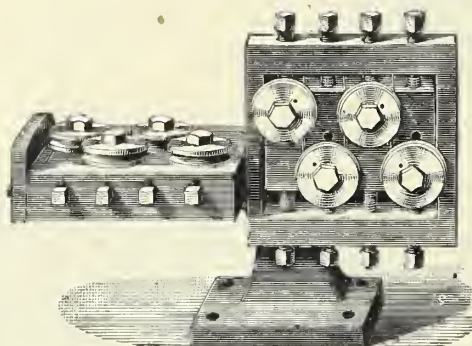
OSCILLATING ROTARY WIRE-STRAIGHTENERS.

SIZE.	3 Dies.	5 Dies.	Iron Pillar.	SIZE.	3 Dies.	5 Dies.	Iron Pillar.
1-16 inch,		\$23.00	\$4.00	$\frac{1}{4}$ inch,	\$32.00	\$37.00	\$7.00
$\frac{1}{8}$ inch,		27.00	5.00	5-16 inch,	37.00	42.00	8.00
3-16 inch,	\$27.00	32.00	6.00	$\frac{3}{8}$ inch,	42.00	47.00	10.00

The above prices include with each machine a full set of dies, made of either white iron, gun metal or Babbitt, as the kind of wire to be straightened may require. In ordering, or writing for further particulars, be sure to specify the sizes and kind of wire to be straightened, and, where the sizes are expressed by numbers, give name of wire gauge used.

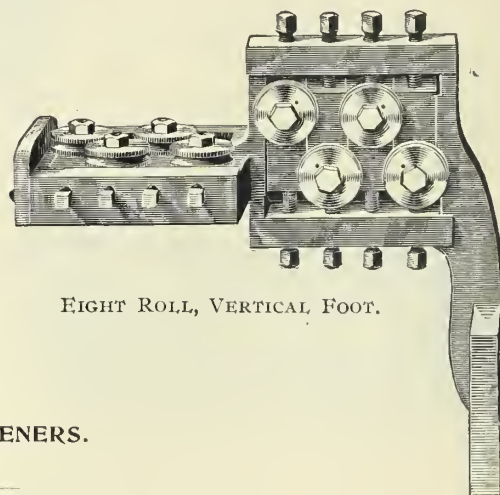
PRENTISS TOOL & SUPPLY CO.

FIG. 476.



EIGHT ROLL, CENTRAL FOOT.

FIG. 477.



EIGHT ROLL, VERTICAL FOOT.

ROLL WIRE STRAIGHTENERS.

ROLL WIRE STRAIGHTENERS, cuts of which are shown, are generally used in connection with automatic machines, the wire being drawn through the straightener before passing into the machine, for the purpose of removing the natural curve, and putting the wire into better shape to be acted upon by the machine's dies.

Roll Wire Straighteners are also used to a considerable extent by manufacturers who have no power, and others who occasionally wish to straighten small lots of wire by hand without being obliged to use belt power. We do not, however, recommend this style of straightener for use on stiff, springy wire, especially if it is desired to get the wire very straight.

The cuts represent the different sizes of these machines with both eight and twelve rolls, and with various styles of foot. The eight roll straighteners are generally used for large wire, and the twelve rolls for small wire, but where much range is desired in large size straighteners it is necessary to have twelve rolls, as the smaller sizes of wire require more points of contact than the larger ones. The cuts with eight rolls and square head screws for adjusting the rolls, represent the three largest size straighteners, *i. e.*, for $\frac{1}{4}$, $\frac{5}{16}$ and $\frac{3}{8}$ inch wire, square head screws being used for adjusting the rolls in both the eight and twelve roll machines of these sizes, but in the three smaller sizes, *i. e.*, $\frac{1}{16}$, $\frac{1}{8}$ and $\frac{3}{16}$ inch, thumb serews are used instead, for both the eight and twelve roll machines.

The prices here quoted are for the machines with either central, vertical or horizontal foot as shown in the cuts.

SIZE.	EIGHT ROLLS.				TWELVE ROLLS.				MOUNTING ON IRON PILLAR.			
$\frac{1}{16}$	-	-	-	-	-	\$22.00	-	-	-	-	-	\$4.00
$\frac{1}{8}$	-	-	-	-	-	26.00	-	-	-	-	-	5.00
$\frac{3}{16}$	-	-	-	-	-	30.00	-	-	-	-	-	6.00
$\frac{1}{4}$	-	-	-	-	-	34.00	-	-	-	-	-	7.00
$\frac{5}{16}$	-	-	-	-	-	38.00	-	-	-	-	-	8.00
$\frac{3}{8}$	-	-	-	-	-	42.00	-	-	-	-	-	9.00

PRENTISS TOOL & SUPPLY CO.

FIG. 478.

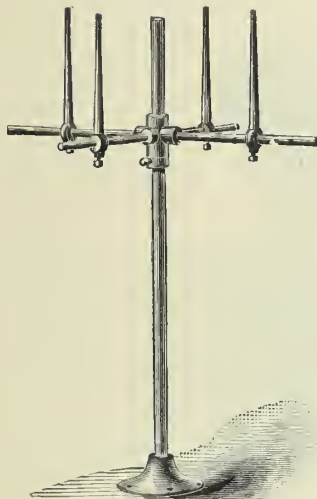


FIG. 479.

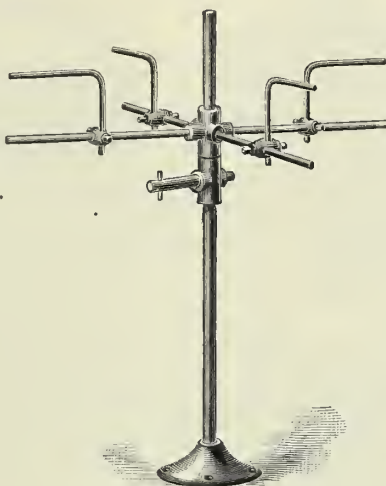
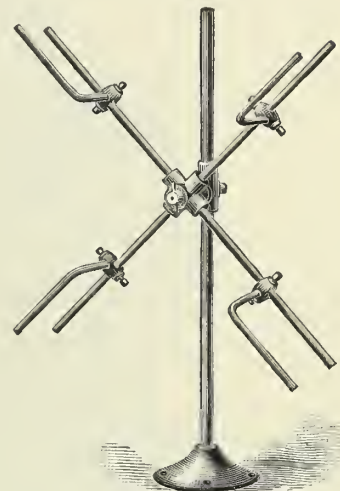


FIG. 480.



ADJUSTABLE WIRE-REELS.

THE HORIZONTAL REELS are designed to be used in connection with all kinds of wire working machinery, for holding the coil of wire in position while it is being fed into the machine. These reels are made in three sizes and are designated Nos. 1, 2 and 3, being intended for light, medium and heavy coils of wire; they are adjustable as to height, also to the diameter of different coils.

We furnish a horizontal reel of suitable size with each of our automatic wire-straightening and cutting machines. When sold singly they are furnished at the following prices :

No. 1, to take coils of wire up to about 30 pounds,	- - - - -	\$2.50
No. 2, to take coils of wire up to about 60 pounds,	- - - - -	3.50
No. 3, to take coils of wire up to about 100 pounds,	- - - - -	4.50

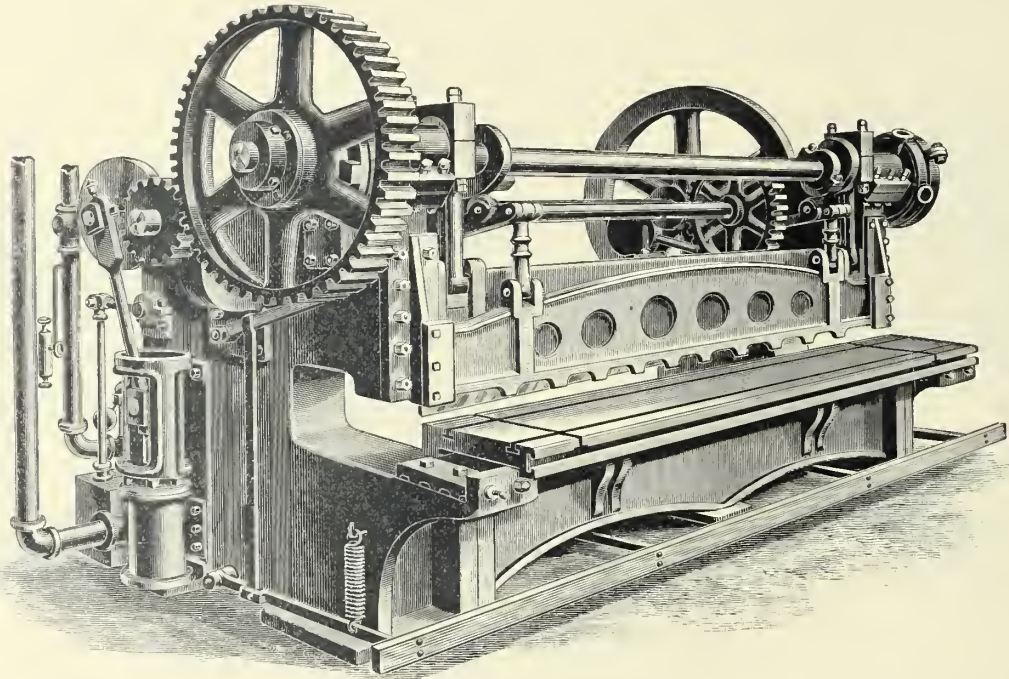
The vertical reel shown will be found particularly convenient for holding coils of wire or narrow strip metal that is to be fed into a press or machine, and especially where it is found desirable to have the coil revolve in a vertical plane. These reels are constructed in such a way that they will hold a coil in either a vertical or horizontal position, as may be required.

The vertical reel is made in three sizes, same as the horizontal described at the top of the page, the sizes being designated by number in the same manner.

No. 1, to take coils up to about 30 pounds,	- - - - -	\$3.00
No. 2, to take coils up to about 60 pounds,	- - - - -	4.00
No. 3, to take coils up to about 100 pounds,	- - - - -	5.00

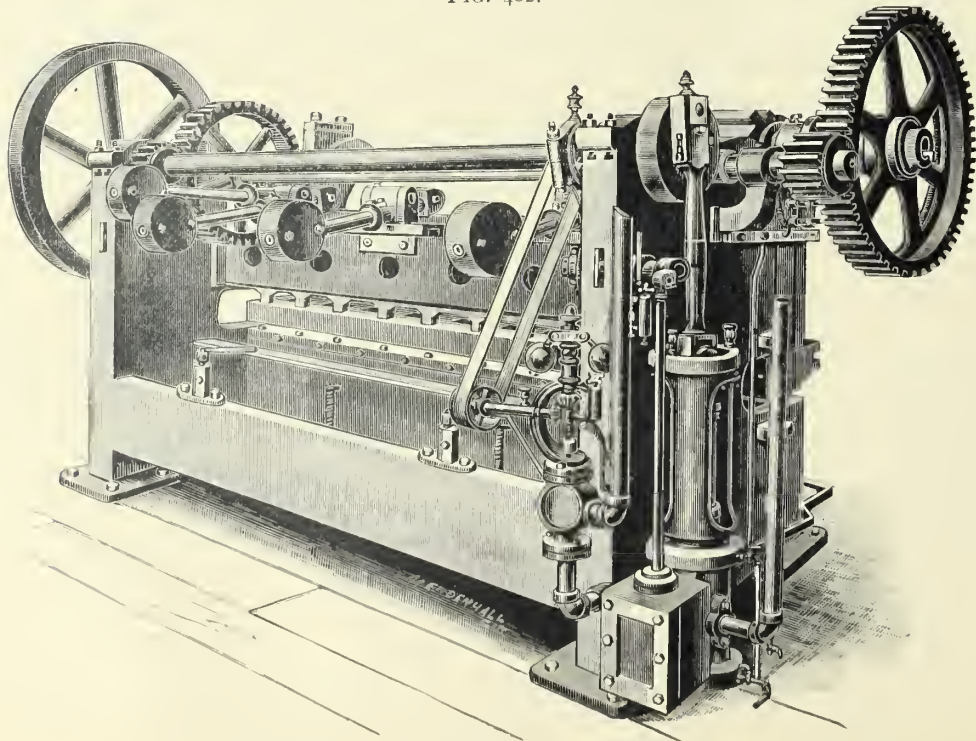
PRENTISS TOOL & SUPPLY CO.

FIG. 481.



No. 1 IMPROVED DOUBLE-GEARED POWER SHEAR.—(Front View.)

FIG. 482.



No. 1 IMPROVED DOUBLE-GEARED POWER SHEAR.—(Rear View.)



NO. 1 IMPROVED DOUBLE-GEARED POWER SHEAR.

CUTS on opposite page illustrate the front and rear view of our improved double-geared power shear, with engine. It is especially designed for rolling mills and heavy sheet-iron workers generally. The frame and all parts are constructed in the most substantial manner, and every point contributing to durability and equalization of strength is provided for. The gate and clamp are constructed to lift high, admitting crooked packs or sheets.

The clamps can be adjusted by right and left screws for the different thicknesses of material used. The bridge tree is provided with center bearing to prevent spring of gate or cutter bar on each machine 90 inches or longer. The eccentrics and connections can also be adjusted for the wear of the shear blades. Our automatic clutch is the most simple and durable made. The throats are 15 inches in depth, but may be enlarged if desirable. A 7 x 10 engine is fastened on one side of housing, and it is adjustable in every part. We furnish with each machine three brackets for table, front, back and side gauges, all necessary wrenches, etc.

Each shear is shipped set up ready for use, and mounted on heavy oak skids. Speed, 200 revolutions.

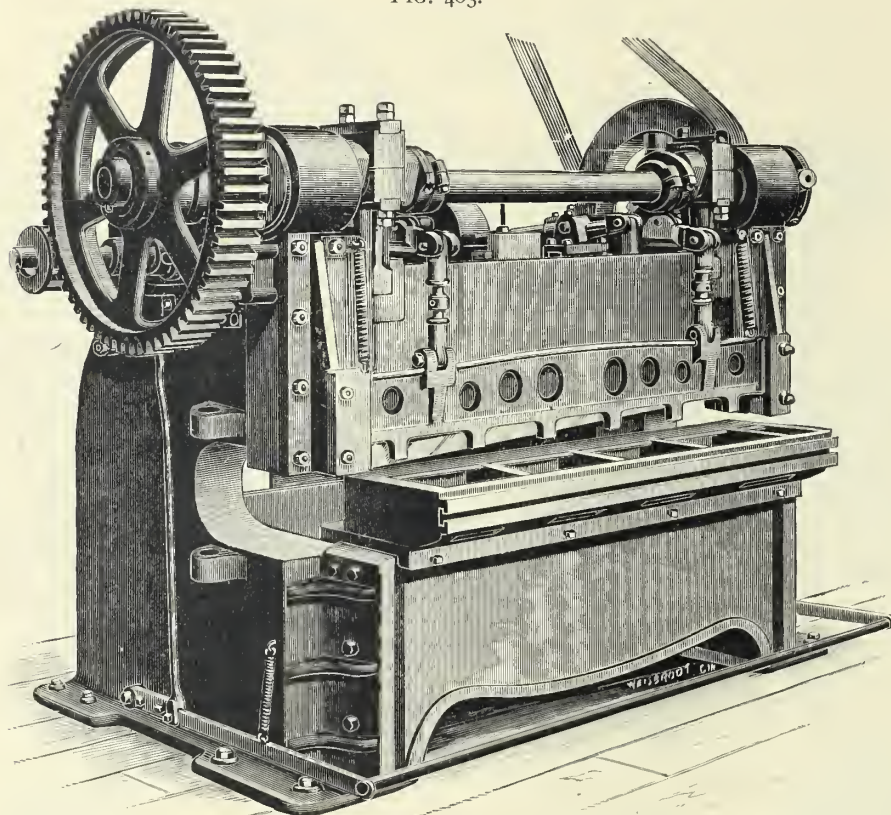
We build a large and small scrap cutter to run direct from these shears for cutting the end and side scrap of packs and sheets. It has two gauges arranged so that all scrap can be cut uniform.

We are able to furnish the trade with shear blades of best quality in all sizes. Also different shapes for special purposes, such as for cutting corrugated iron, etc. Write for prices.

Inch.	Will Cut.	Weight.	Price.	Without Engine, less.	Single Gear, less.	Without Clamp, less.
126	$\frac{5}{16}$	21000				\$75.00
102	$\frac{5}{16}$	20000				75.00
90	$\frac{3}{8}$	18500				75.00
78	$\frac{3}{8}$	17000				60.00

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FIG. 483.



No. 2 IMPROVED DOUBLE-GEARED POWER SHEAR.

CUT above shows same machine as described, only arranged for belt power. It is run directly from balance wheel at a speed of 200 revolutions. Brackets, gauges, wrenches, etc., are furnished. We also build this machine single geared for shearing lighter material. Table same as on previous page, less \$225, the price of engine.

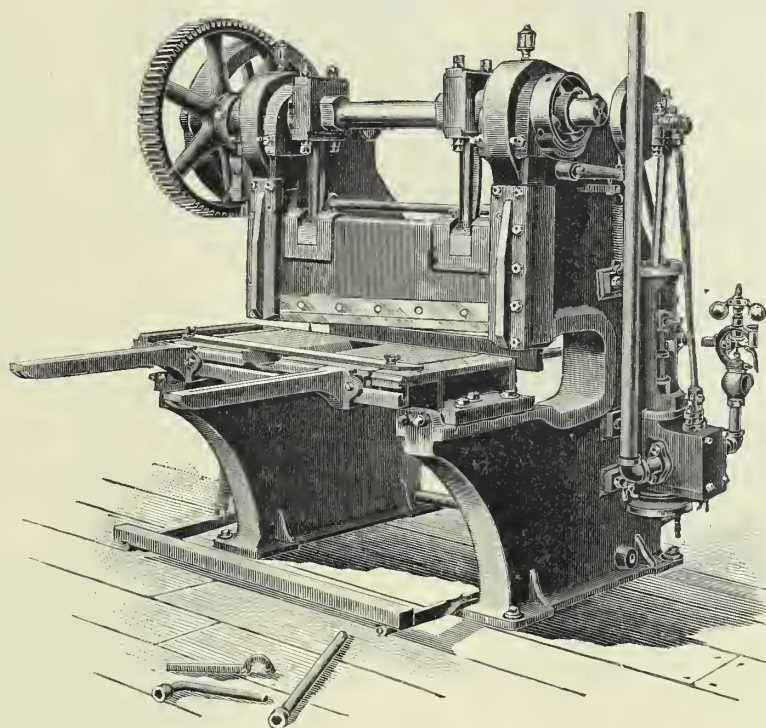
No. 3.—We also build a shear No. 3, or medium weight, of the same type as the above only lighter weight and single gearing, with automatic clutch and clamp. Brackets, gauges, etc., furnished. The treadle is constructed so that it may be operated from either end. Size of engine, 5 x 7; speed, 175 revolutions.

MEDIUM WEIGHT POWER SHEAR No. 3.

Inch.	Cut.	Weight with Engine.	Price with Engine.	Without Engine, less	Without Clamp, less
124	$\frac{3}{16}$	13500		\$150.00	\$60.00
100	$\frac{1}{8}$	12250			60.00
88	$\frac{1}{4}$	10500			50.00
76	$\frac{1}{4}$	9000			50.00
64	$\frac{1}{4}$	8250			50.00

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FIG. 484.



NEW PACK SHEAR.

THE above illustration is a new Pack Shear for tin plate, and has been adopted by the mills generally. It is built extra heavy to stand the strain of rapid and continuous operation, and at the same time cut accurately ; and is adjustable for the wear of shear blades without the use of liners. The machine will cut up to $\frac{3}{16}$ inch metal easily.

Blades 41 inches long, weight, about 4200 pounds.

It is built with or without engine, and with or without gearing ; furnished with all necessary gauges, wrenches, etc., etc.

Made in sizes 100 inches, 84 inches, 72 inches, 60 inches, 48 inches, 42 inches.

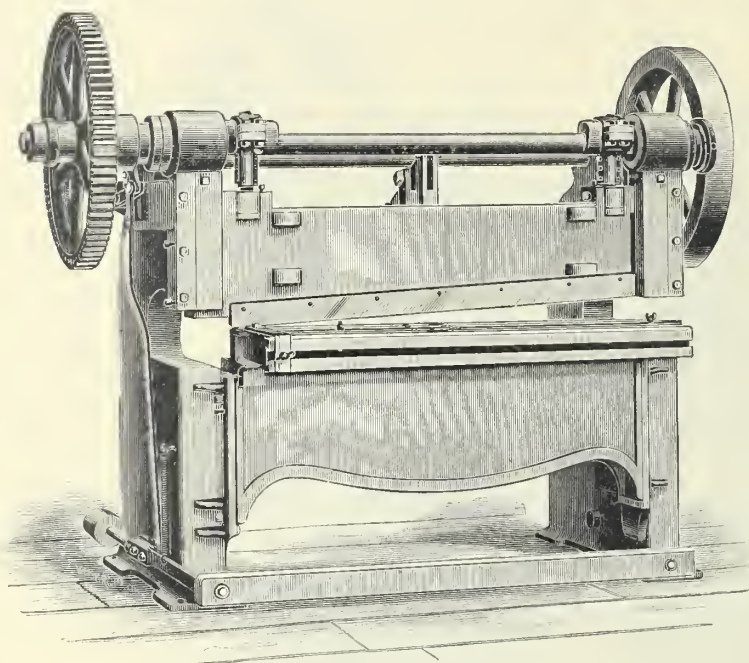
Price with engine,

Price without engine,

Price without engine or gearing,

PRENTISS TOOL & SUPPLY CO.

FIG. 485



No. 4 LIGHT OVER-GEARED POWER SHEAR.

In construction this machine is mainly the same as cut on page 6, except it is shown here without clamp.

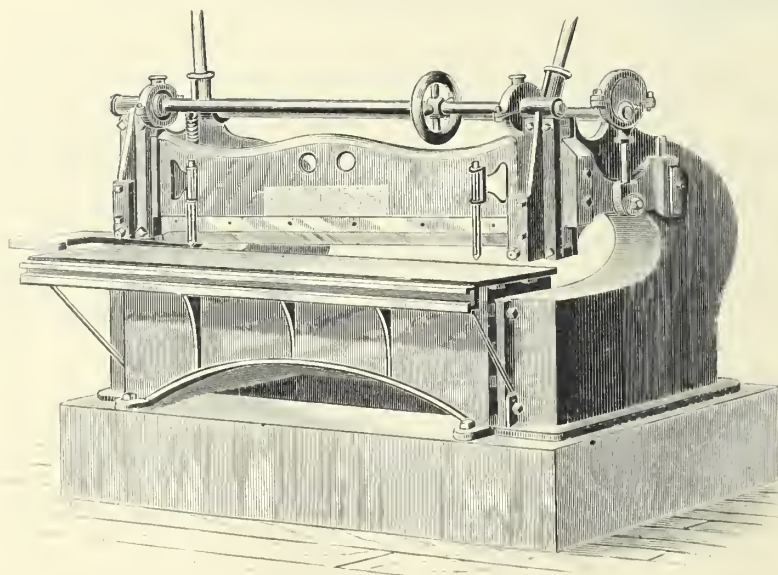
We build it with clamp, however, unless otherwise ordered, but if not needed will make allowance for same as per table.

The crank shaft and connections are made of hammered steel; adjustable for wear and tear of blades same as our other shears.

All necessary tools are furnished. Speed, 150 revolutions per minute. Shear is also built without gearing for cutting light sheet iron and tin plate packs.

Inch.	Will Cut.	Cut Without Gear.	Will Weigh.	Price.	Without Clamp.
84	No. 10	16	6000	...	\$40 00
72	No. 10	16	4800	.....	35 00
60	No. 10	16	4200	.....	35 00
48	No. 8	14	3800	.....	30 00
42	No. 8	14	3200	.....	25 00

FIG. 486.



No. 7 EXTRA HEAVY HAND SHEAR.

This machine is especially made for the use of coppersmiths, rangemakers, and all medium heavy sheet-iron workers. A sheet 36 inches wide may be slit through the middle and of any length desired. It cuts copper and brass sheets $\frac{1}{8}$ -inch thick.

Clamp and trap leaf table may be furnished, if ordered extra.

Length, 36 inches.	Cuts No. 14 iron.
Weight, 1200 pounds.	Price, \$
Length, 42 inches.	Cuts No. 14 iron.
Weight, 1400 pounds.	Price, \$
Length, 48 inches.	Cuts No. 14 iron.
Weight, 1500 pounds.	Price, \$

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IRON CUTTER AND SHEAR.

GENERAL DESCRIPTION.

All points where pressure is applied have a rolling contact, thus reducing the friction to a minimum.

The cutters for the round iron are bushings made from best cast steel, carefully tempered and held in place by set-screws.

Five sets of bushings accompany each machine, each set in its proper place, ready for instant use. No time lost in changing bushings.

Bushings may be readily removed for grinding or other purposes, by simply loosening the set screws. Keep the bushings close together and the set-screws tight.

The shear blades have a drawing cut, consequently there is never any tendency to crowd the work out of the shear.

Blades are of best tool steel face, backed up with wrought iron. They can be easily taken out and ground.

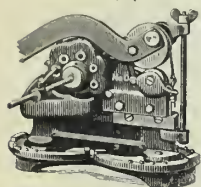
The movable blade is raised by a neat steel band, thus dispensing with springs or other devices which use power.

Each machine has a gauge for cutting stock to length.

Flat stock may be cut of any length. The shears are continuous.

Remove tie-bolt for continuous cutting.

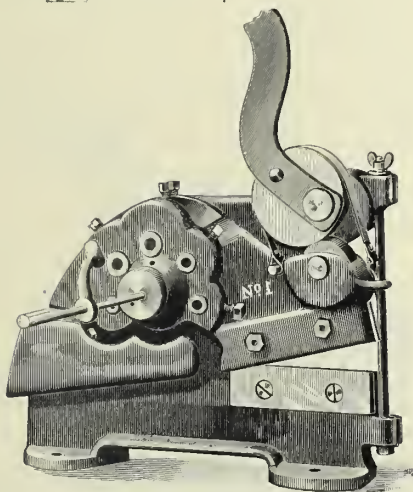
FIG. 487.



No. 0.

Cuts round iron,	- - -	1/4 inch and under
Cuts flat iron,	- - -	1-16 inch and under
Weight,	- - -	14 pounds
Price,	- - -	\$18.00

FIG. 488.



No. 1.

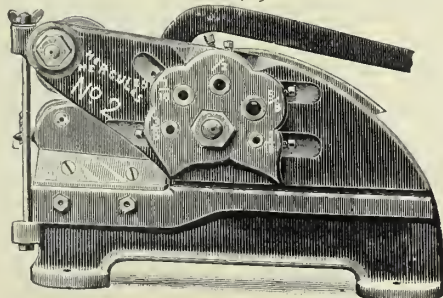
Cuts round iron,
1/2 inch and under.

Flat iron,
3-16 inch and under.

Weight,
80 pounds.

Price,
\$30.00

FIG. 489.



No. 2.

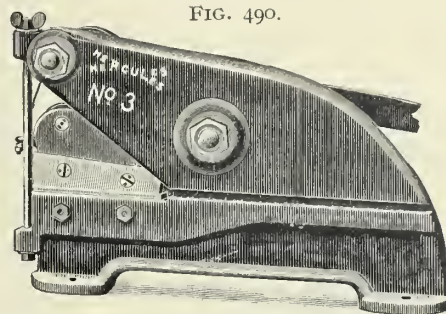
Cuts round iron,
3/8 inch and under.

Flat iron,
1/4 inch and under.

Weight,
110 pounds.

Price,
\$42.00

FIG. 490.



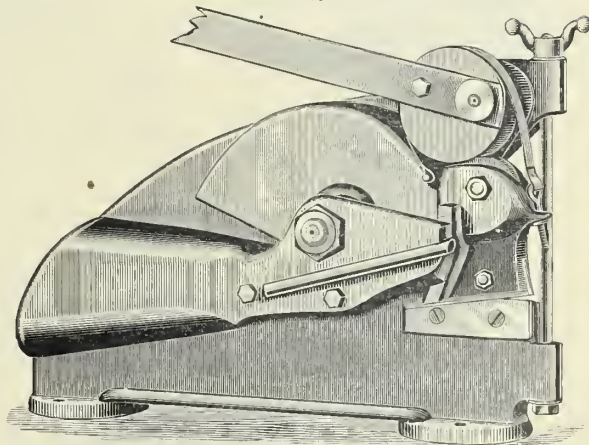
No. 3.

Cuts flat iron only,
1/4 inch and under.

Weight,
100 pounds.

Price,
\$24.00

FIG. 491.

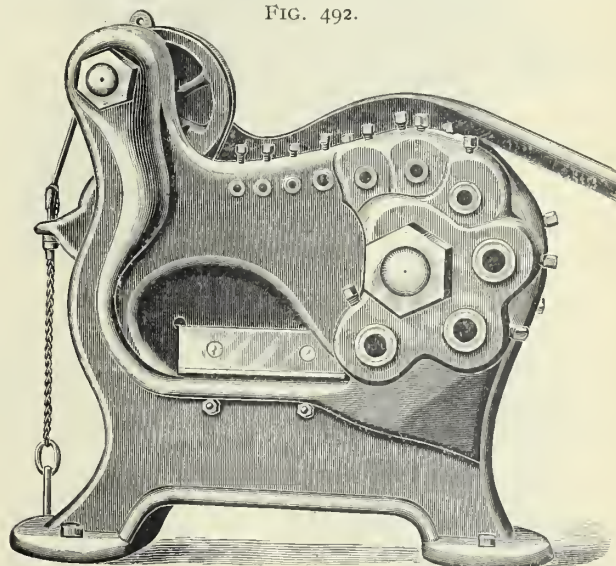


No. 4.

Cuts flat iron only, 5-16 inch and under. Weight, 250 pounds. Price, \$50.00

No. 5.—Same as No. 4, with addition of bushings for cutting round iron 1/4 inch and under. Price, \$60.00.

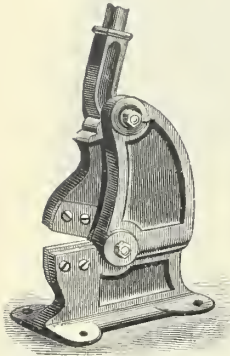
FIG. 492.



Stock Room Cutter.—Has a full set of bushings, from 1/4 inch to 1 inch, inclusive. Cuts bar iron to 1/2 inch thick. Weight, 400 pounds. Price, \$125.00

PRENTISS TOOL & SUPPLY CO.

FIG. 493.



FLAT BAR IRON SHEAR.

REAR WORKING LEVER.

(Description, etc., Fig. No. 493.)

Size.	Capacity.	Blade.	Weight.	Price.
0	$\frac{3}{4} \times \frac{1}{8}$	1 $\frac{1}{2}$ inches	4 pounds	\$6.00
1	$1\frac{3}{4} \times \frac{1}{8}$	3 inches	30 pounds	10.00
2	$1\frac{3}{4} \times \frac{1}{4}$	3 $\frac{1}{8}$ inches	68 pounds	17.00
3	$2 \times \frac{5}{16}$	3 $\frac{1}{8}$ inches	88 pounds	22.00
4	$2 \times \frac{3}{8}$	3 $\frac{3}{4}$ inches	155 pounds	35.00

PLATE IRON SHEAR.

(Description, etc., Fig. No. 494.)

Size.	Capacity.	Blade.	Weight.	Price.
1	$\frac{3}{16}$ iron	4 inches	115 pounds	\$40.00
2	$\frac{1}{4}$ iron	4 inches	175 pounds	50.00
3	$\frac{5}{16}$ iron	4 inches	300 pounds	66.00
4	$\frac{3}{8}$ iron	4 $\frac{1}{2}$ inches	450 pounds	90.00

FIG. 494.

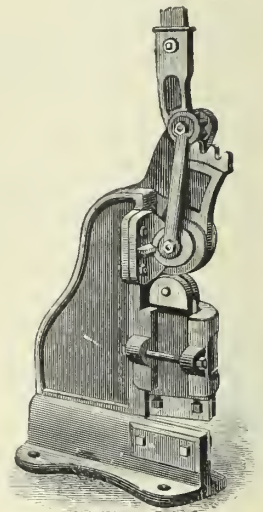
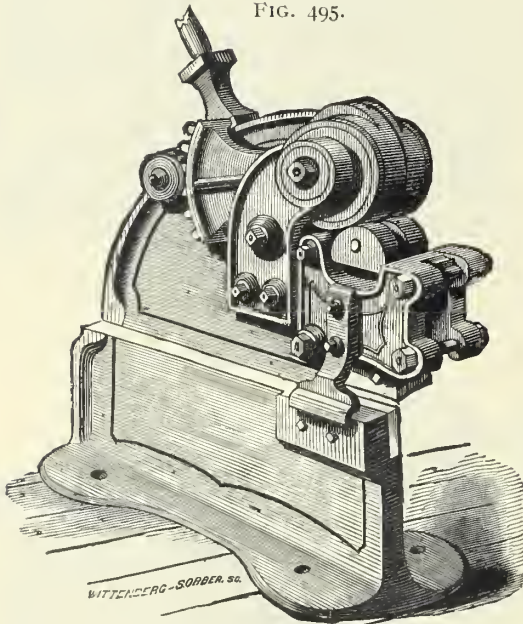


FIG. 495.

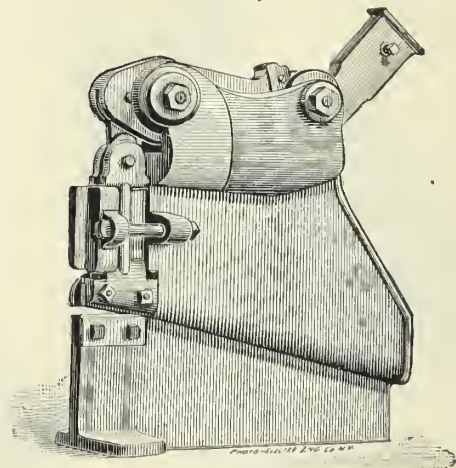


No. 5 PLATE IRON SHEAR.

This tool is worked by a simple and peculiarly formed ratchet on the pinion shaft, so that more than one stroke of a moderately long lever is necessary to make a complete stroke of the plunger, as an excessively long lever is necessary to cut this weight material at one motion. In this tool all work is done from back of machine, requiring two or more men to cut a sheet of iron.

Capacity,	- - - - -	$\frac{7}{16}$ plate iron
Shear blades,	- - - - -	5 $\frac{1}{2}$ inches long
Weight,	- - - - -	750 pounds
Price,	- - - - -	\$150.00

FIG. 496.



No. 11 PLATE IRON SHEAR.

This tool has a somewhat different construction than any other Plate Shears, and was originally designed for special conditions, and afterward added to the regular list. The construction is very clearly shown in cut. The bearing pins are firmly held at each end, and the lever working at the rear by means of the pinion gives great power. The link bears both on steel pin and on its ends. The front plunger-guide is planed to go between supports on the body of machine, making it very firm, while it is adjustable by the bolt shown in front.

Capacity,	- - - - -	$\frac{3}{8}$ inch plate iron
Weight,	- - - - -	450 pounds
Price,	- - - - -	\$110.00

PRENTISS TOOL & SUPPLY CO.

FIG. 497.

SQUARE IRON SHEARS.

(Description, etc., Fig. No. 497.)

These shears have the holes through castings and knives made square, so that the corners are not rounded or sides burred or flattened in cutting off. A great advantage and saving of time in making railings and similar work.

No. 1 will cut	-	-	$\frac{1}{4}$ inch and smaller	-	-	weighs 15 pounds,	-	-	\$11.00
No. 2 will cut	-	-	$\frac{5}{16}$ and $\frac{1}{4}$ inch	-	-	" 21 pounds,	-	-	15.00
No. 3 will cut	-	-	$\frac{3}{8}$, $\frac{5}{16}$ and $\frac{1}{4}$ inch	-	-	" 26 pounds,	-	-	20.00
No. 4 will cut	-	-	$\frac{1}{2}$, $\frac{3}{8}$ and $\frac{5}{16}$ inch	-	-	" 42 pounds,	-	-	25.00
No. 5 will cut	-	-	$\frac{5}{8}$, $\frac{1}{2}$ and $\frac{3}{8}$ inch	-	-	" 94 pounds,	-	-	38.00
No. 6 will cut	-	-	$\frac{3}{4}$, $\frac{5}{8}$ and $\frac{1}{2}$ inch	-	-	" 135 pounds,	-	-	52.00
No. 7 will cut	-	-	$\frac{7}{8}$, $\frac{3}{4}$, $\frac{5}{8}$ and $\frac{1}{2}$ inch	-	-	" 225 pounds,	-	-	65.00
No. 8 will cut	-	-	1, $\frac{7}{8}$, $\frac{3}{4}$, $\frac{5}{8}$, and $\frac{1}{2}$ inch	-	-	" 284 pounds,	-	-	85.00

We do not guarantee Shears to cut steel, except upon special application, stating size and quality of steel.

FIG. 498.

HAND SHEAR.

(Specifications Fig. No. 498.)

No. of Shear,	-	-	-	-	-	-	-	-	-
Weight, about	-	-	-	-	-	-	-	-	-
Will shear or split plate iron,	-	-	-	-	-	-	-	-	-
Length of blades,	-	-	-	-	-	-	-	-	-
Length of levers,	-	-	-	-	-	-	-	-	-
	lbs.	1	2	3	4	5	6	7	8
	in.	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$
	in.	3	4	$5\frac{1}{2}$	$7\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$9\frac{1}{2}$	10
	ft.	$1\frac{1}{2}$	$2\frac{3}{4}$	4	$5\frac{1}{2}$	6	$6\frac{1}{2}$	$6\frac{1}{2}$	$6\frac{1}{2}$

ANGLE IRON SHEAR.

(Description, etc., Fig. No. 499.)

The body castings of this Shear are made extra heavy, the knives being very heavy, are supported at each end to prevent breaking.

It will cut off 3 x 3 inches and smaller sizes of angle iron at one motion of lever, but as the blade for 3 inch angle injures the shape of the smaller sizes, we furnish, when ordered, an extra upper blade for the 2 inch angles and smaller.

Machine, with one pair of knives,	-	-	\$60 00
Extra upper blade for 2 inch angle and smaller,	-	-	4 00
Extra blades, per pair,	-	-	10 00

SMALL LEVER WIRE ROPE SHEAR.

(Description, etc., Fig. No. 500.)

Capacity is up to $1\frac{1}{8}$ in. steel cable. Weight, 175 lbs.

Cast iron,	-	-	\$45.00
Cast steel socket and swing piece,	-	-	56.00
All steel,	-	-	64.00

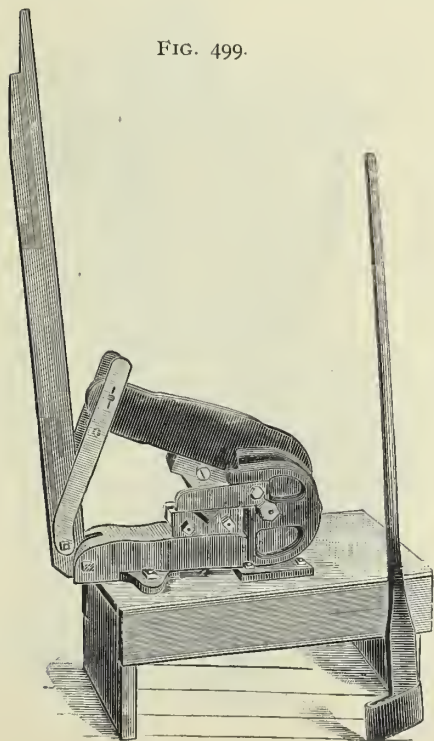


FIG. 499.

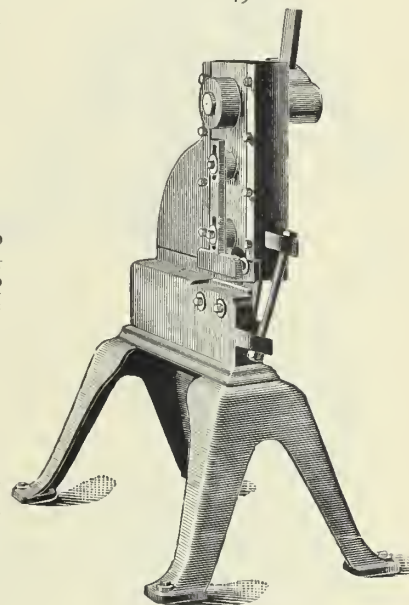
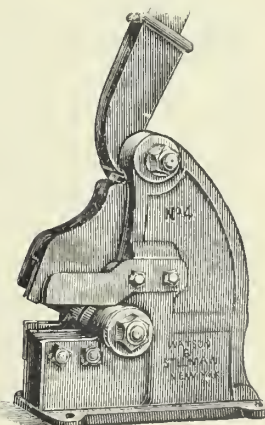
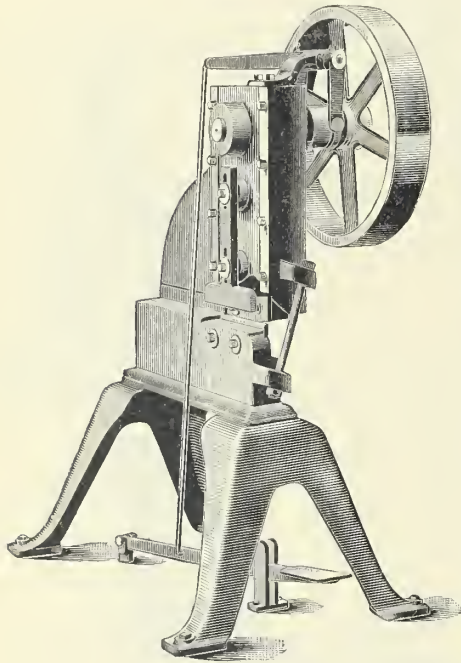


FIG. 500.



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FIG. 501.



POWER SHEAR.

THE No. 21 is made without legs, to be used on a bench. We furnish this machine to order, with the cam shaft extended through so as to attach the regular hand lever, making it capable of use by either hand or power, at an extra cost of 10 per cent.

These machines are rated at what they are capable of doing by hand. For use with a belt, we do not recommend them to perform over one-half the rated duty.

All sizes, except No. 21, have the automatic start and stop motion; also, the tie bolt.

SPECIFICATIONS.

No. of shear, - - - - -	21	22	23	24	25	26	27	28
Weight, about - - - - -	75	225	400	550	800	1200	1400	1700
Thickness of plate iron will slit or cut, - - - - -	in. $\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$
Length of blades, - - - - -	in. 3	4	5½	7½	8½	9½	9½	10
Diameter of balance wheel, - - - - -	in. 12	14	17	21	25	28	30	30
Width of balance wheel, - - - - -	in. 2¼	3	3	3¼	4	4	5	5
Revolutions per minute, - - - - -	70	70	70	60	60	50	50	40

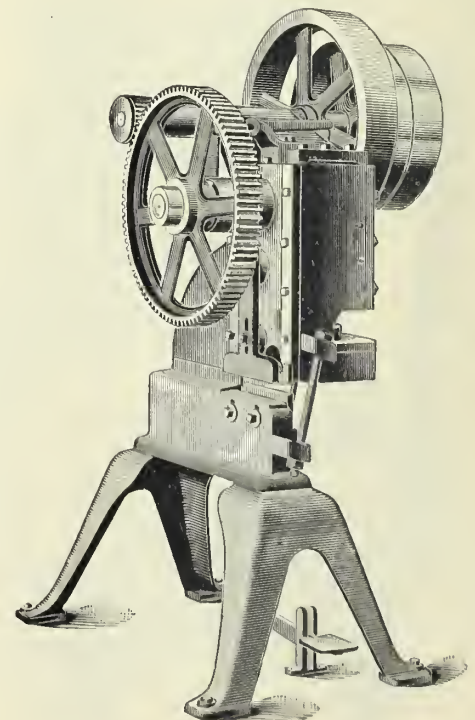
FIG. 502.

GEARED POWER SHEAR.

ALL SIZES HAVE THE AUTOMATIC START AND STOP MOTION, AND ARE FURNISHED WITH THE TIE BOLT.

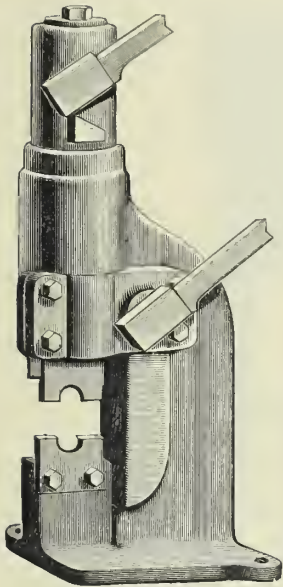
SPECIFICATIONS.

No. of shear, - - - - -	31	32	33	34	35	36	37	38
Weight, about - - - - -	lbs. 100	300	475	600	975	1400	1600	1900
Thickness of iron will slit or cut - - - - -	in. $\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$
Length of blades, - - - - -	in. 3	4	5½	7½	8½	9½	9½	10
Diameter of balance wheel, - - - - -	in. 12	14	17	21	25	28	30	30
Width of balance wheel, - - - - -	in. 2¼	3	3	3½	4	4	5	5
Diameter of tight and loose pulleys, - - - - -	in. 10	12	16	18	20	22	24	
Width of pulleys, - - - - -	in. 2½	3	3	3½	3½	4	4	
Speed of pulleys—revolutions per minute, - - - - -	280	280	300	300	300	250	250	240
Ratio of gearing, - - - - -	1:4	1:4	1:5	1:5	1:5	1:5	1:5	1:6



PRENTISS TOOL & SUPPLY CO.

FIG. 503.



HYDRAULIC SHEARS FOR ROUND IRON AND WIRE ROPE.

(Description, etc., Fig. No 503.)

IN THIS TOOL, the same features are to be found which make our other special hydraulic punches so valuable. The blades of the shear can be raised high enough to allow the iron or rope to be easily placed in hollowed blades, and the upper blade brought immediately down on its work without the loss of time caused by pumping. As the body of the machine is made of steel it can be made open in front, and be both strong and light. In operating, the upper lever socket must be brought down against the lug before the raising and lowering lever can be used.

No. 1 cuts $1\frac{1}{4}$ inch round iron.	Weights 150 pounds.	Price, \$150.00
No. 2 cuts $1\frac{3}{8}$ inch round iron.	Weights 225 pounds.	Price, 175.00
No. 3 cuts 2 inch round iron.	Weights 450 pounds.	Price, 200.00
No. 4 cuts $2\frac{1}{4}$ inch round iron.	Weights 550 pounds.	Price, 250.00

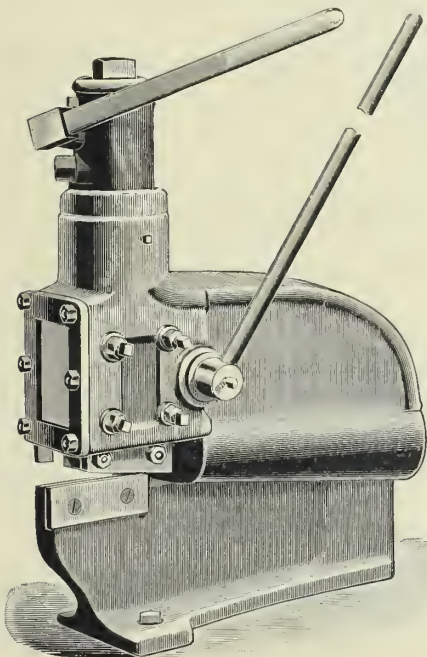
We are always ready to build larger and special sizes or shapes of shears.
Plain wood truck with iron axles and wheels for either size, \$7.50.

PIPE CUTTING AND SHEET SPLITTING SHEAR.

(Description Fig. No 504.)

THIS Shear was at first produced by us for cutting off in the field lengths of wrought iron pipe in order to make connection when desired. The perfect or quick adjustment of the tool is the same as in our hydraulic punches. The ram is specially shaped to adapt it to hold properly the shear blade, which guides closely upon the body. For shearing off the end of pipe the lower blade is made approximately of same curvature as inside of the pipe, so that no distortion shall take place. The lever shown in place raises and lowers the ram when not under pressure, the actual work of shearing having to be done by a lever placed in the head socket. The tool is a No. 1, cutting iron $\frac{3}{8}$ inch thick, the blade being 5 inches long. The depth of jaw 6 inches. Weight, 225 pounds.

FIG. 505.



Price, - - - \$180.00

HYDRAULIC PLATE IRON SHEAR.

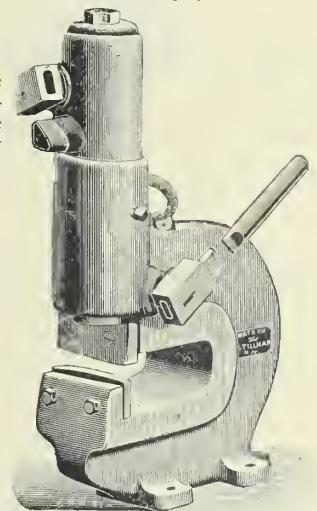
(Description Fig. No. 505.)

FOR several years we have been occasionally called upon for a portable shear which could be used upon plate iron heavier than $\frac{7}{16}$, but until we devised the raising device on our hydraulic punch, could not combine compactness, ease of operation and convenient return stroke to the shear plunger. The satisfactory working of that device led us to get up this tool, and it is now offered after a long satisfactory trial to those wanting a small portable tool capable of easy work. In order to give lightness to the tool and strength to the edge near the knives, the entire body is made of steel. In operating this shear, until one becomes used to it, the lug of the lever had better be kept down until the end of the stroke, then reverse the lever and bring the socket down on the lug and lift plunger with lower socket lever. The latter may be weighted and made automatic if desired.

No. 3 shear cuts plate steel $\frac{3}{8}$ inch thick and weighs about 475 pounds.

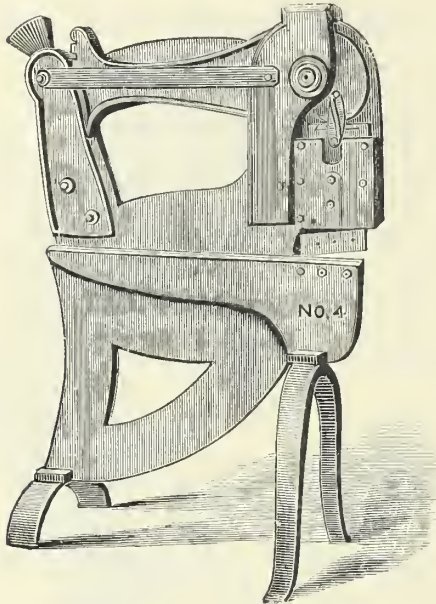
Price, - - - \$300.00

FIG. 504.



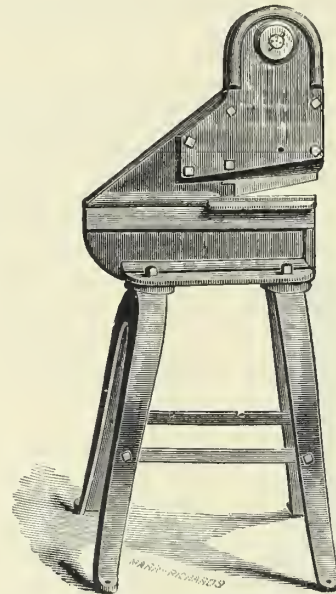
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FIG. 506.



No. 4 A, AND No. 4 B SHEARS.

FIG. 507.



No. 4 O SHEAR.

FOR BOILER MAKERS AND SHEET METAL WORKERS.

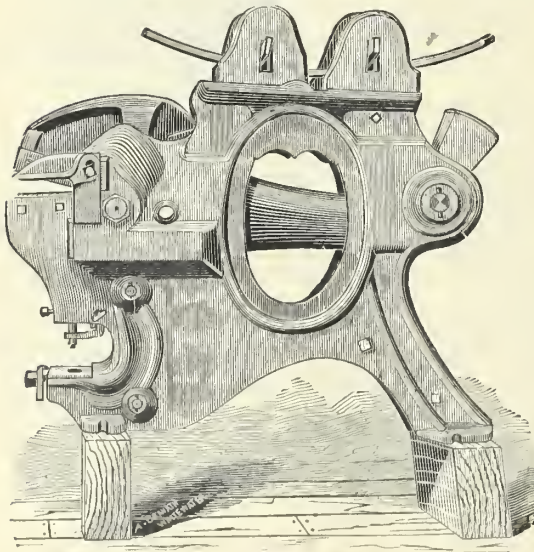
No. 4 O. This Shear will cut $\frac{1}{4}$ inch plate of any width or any length; will also do any lighter work. The lever works either to front or rear. It can be bolted to a bench if desired. The machine is furnished complete ready for use with the necessary levers and two upper and one lower knife. Weight, 285 pounds. Price with legs, \$ without legs, \$

No. 4 A Shear will cut $\frac{5}{16}$ inch plate of any width or any length. Weight, 520 pounds. Price, \$

No. 4 B Shear will cut $\frac{1}{2}$ inch plate of any width or any length. Weight, 1135 pounds. Price, \$

These machines are furnished complete, ready for use, with the necessary levers and two upper and one lower knife. We can furnish with either of the above shears an attachment for beveling sheets. Price, \$ extra.

FIG. 508.



PUNCHES, SHEAR AND UPSETTER.

FOR HAND POWER—TWO SIZES.

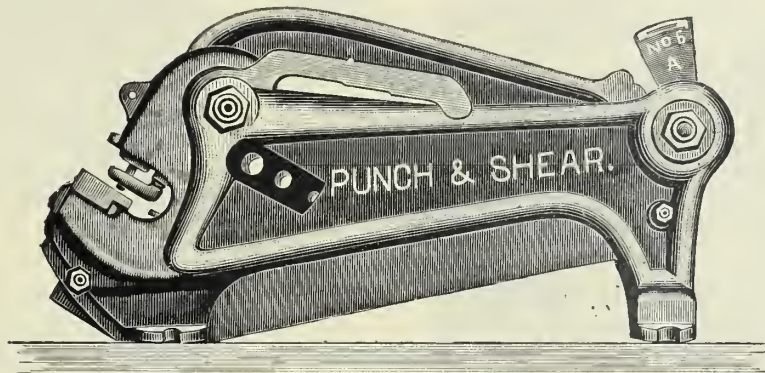
These machines are so arranged that the knives for flat and round iron are independent of each other and of the punch, and knives and punch are also independent of upsetter, so that the machine is always ready for use for punching, shearing or upsetting without any change. The machines are strong and powerful and guaranteed to do the work as listed. We send with each machine the necessary knives for cutting flat and round iron, also levers and wedges and three sets of round punches and dies. Every machine is tested before being shipped, and when shipped it is complete, ready for use, either as a punch, shear or upsetter.

Size A will punch a $\frac{1}{2}$ inch hole in $\frac{3}{8}$ inch iron, and will cut $2 \times \frac{3}{4}$ inch flat bar iron and $\frac{3}{4}$ inch round iron, and will upset 2 inch tire or less. Weight 300 pounds. Price, \$

Size C will punch a $\frac{1}{2}$ inch hole in $\frac{1}{2}$ inch iron, and cut $4 \times \frac{1}{2}$ inch flat bar iron or 1 inch round iron, and upset 4 inch tire or less. Weight, 600 pounds. Price, \$

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FIG. 509.

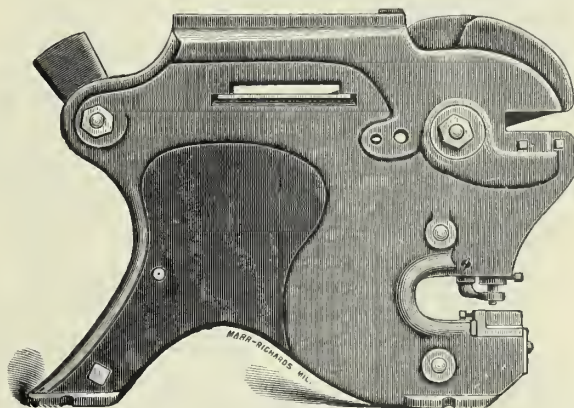


HAND POWER PUNCH AND SHEAR.

THE No. 6 A will punch a $\frac{1}{2}$ inch hole in $\frac{1}{2}$ inch iron or a $\frac{3}{4}$ inch hole in $\frac{3}{8}$ inch iron, and cut $2\frac{1}{2} \times \frac{1}{2}$ inch or $6 \times \frac{1}{4}$ inch flat bar iron, or $\frac{7}{8}$ inch round iron, or their equivalents. The knives for flat and round iron are independent of each other and of the punch, and both sets of knives as well as punch are at all times ready for use without any change. The machines are strong and powerful and guaranteed to do the work as listed. We send with each machine all the necessary knives for cutting flat and round iron, also necessary levers and one each $\frac{1}{2}$ inch, $\frac{3}{8}$ inch and $\frac{1}{4}$ inch round punch and die. Each machine is tested in our shops, and when shipped is complete, ready for use.

Weight, 300 pounds. Price, \$

FIG. 510.

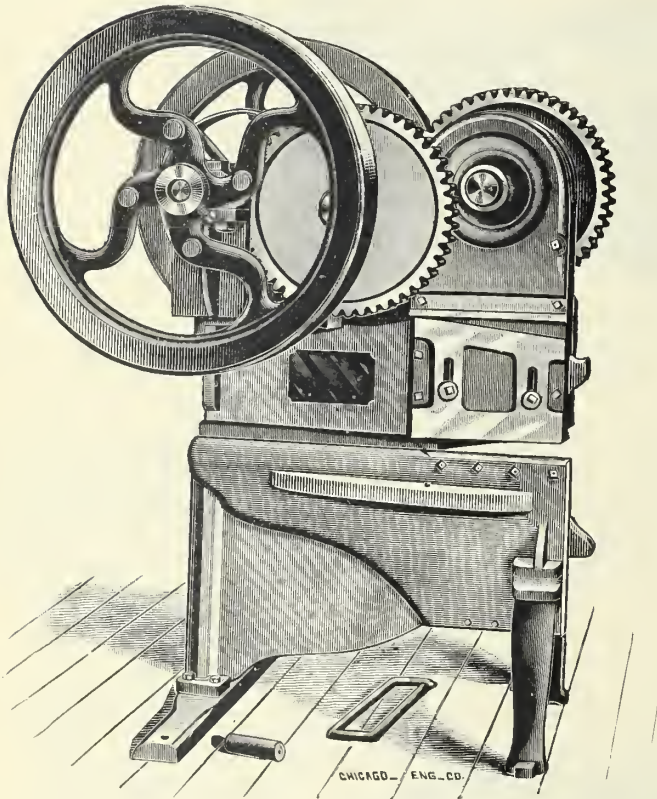


HAND POWER PUNCH AND SHEAR.

THE No. 2 C will punch a $\frac{5}{8}$ inch hole in $\frac{1}{2}$ inch iron, and will cut $4 \times \frac{1}{2}$ inch flat bar iron or 1 inch round iron, or $6 \times \frac{1}{4}$ inch plow steel. The knives for flat and round iron are independent of each other, and of punch, and machine is always ready for cutting or punching without any change. It is strong and powerful, and guaranteed to do the work as listed. We send with each machine one round punch and die of any desired size, also all necessary knives for cutting flat and round iron, and all levers. Machine is thoroughly tested before leaving our shops, and when shipped is complete, ready for use. Weight, 600 pounds. Price, \$

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FIG. 511.



No. 3 A AND No. 3 B SHEARS.

FOR CUTTING PLATES OF ANY WIDTH OR ANY LENGTH.

No. 3 A will cut plates $\frac{3}{8}$ inch or less in thickness, and of any width or any length. Weight, 2000 pounds. Tight and loose pulleys, 12 x $3\frac{1}{2}$ inches. Price, \$

No. 3 B will cut plates $\frac{1}{2}$ inch or less in thickness, and of any width or any length. Weight, 3900 pound. Tight and loose pulleys, 18 x 6 inches. Price, \$

The shear will also cut bar iron when link is in place.

No. 3 O SHEAR.

FOR CUTTING $\frac{3}{16}$ INCH OR LIGHTER PLATES OF ANY WIDTH OR ANY LENGTH.

This machine is especially adapted for cutting up light sheets of any size. The plate will clear the machine as it is fed in to the knives. The machine has a clutch by which it can be started and stopped at any point of the stroke. It has tight and loose pulleys, 8 x $2\frac{1}{2}$ inches. Weight, 600 pounds. Price, \$

FIG. 512.

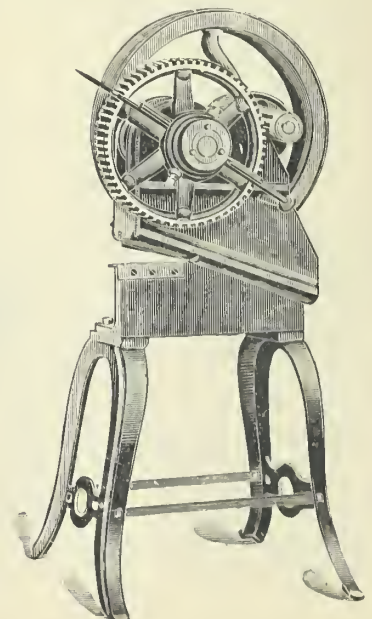
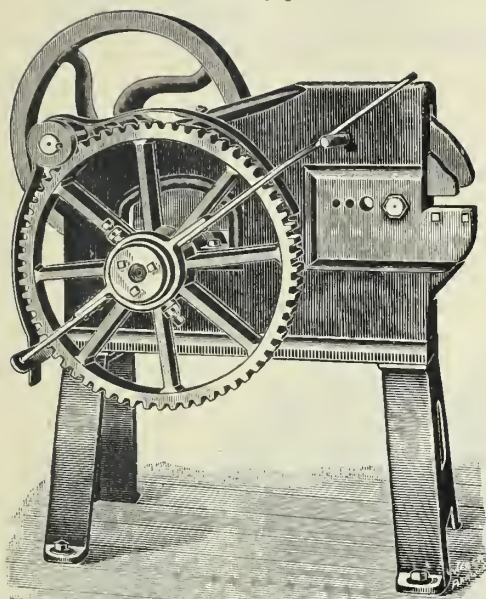


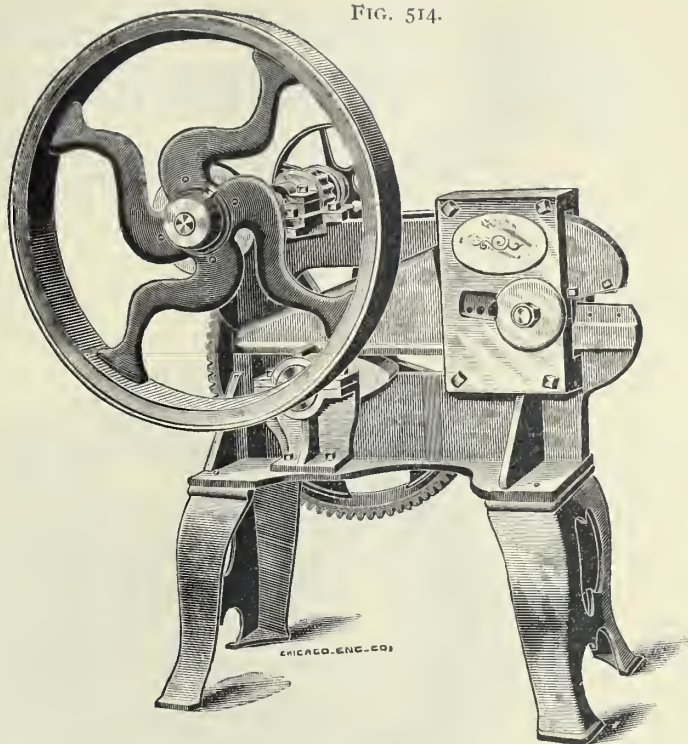
FIG. 513.



No. 7 A SHEAR.

No. 7 A Shear will cut $3 \times \frac{1}{2}$ inch flat bar iron or 1 inch round iron, or their equivalents. Belt runs on balance wheel, which is $24 \times 3\frac{1}{2}$ inches, and should make 300 revolutions per minute.

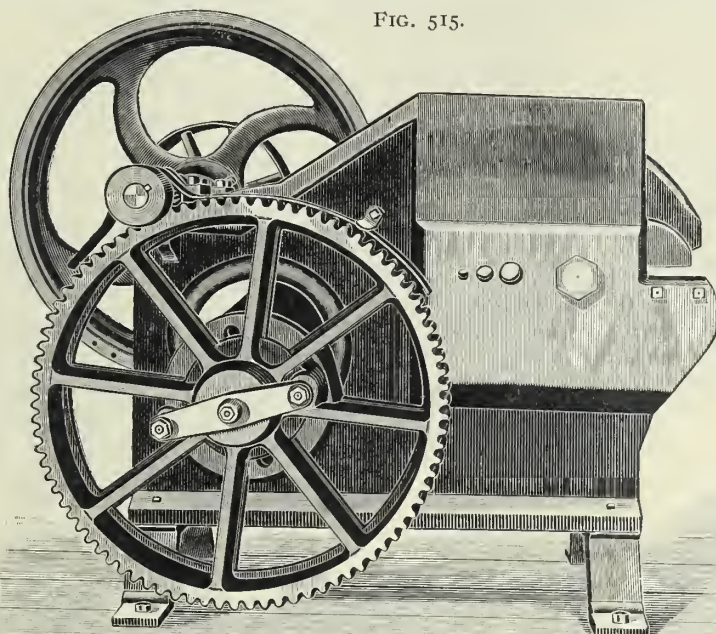
FIG. 514.



No. 7 B SHEAR.

No. 7 B Shear will cut $4 \times \frac{1}{2}$ inch flat bar iron or $1\frac{1}{4}$ inch round iron, or their equivalents. Has tight and loose pulleys, 15×4 inches, which should make 225 revolutions per minute.

FIG. 515.



No. 7 C, No. 7 D AND No. 7 E SHEAR.

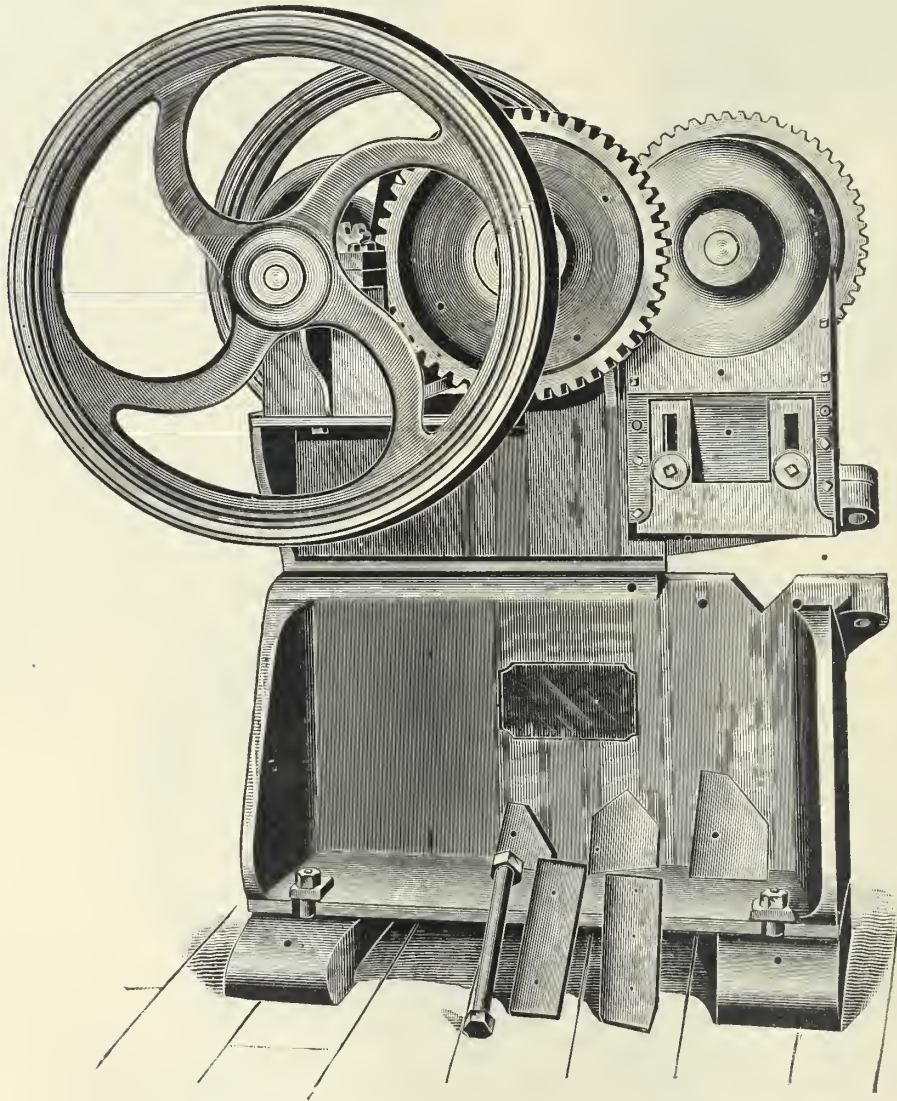
No. 7 C Shear will cut $5 \times \frac{3}{8}$ inch flat bar iron and $1\frac{1}{2}$ inch round iron, or their equivalents. Has tight and loose pulleys, 15 by 5 inches, which should make 225 revolutions per minute.

No. 7 D Shear will cut $6 \times \frac{3}{4}$ inch flat bar iron or 2 inch round iron, or their equivalents. Has tight and loose pulleys, 20×6 inches, which should make 225 revolutions per minute.

No. 7 E Shear will cut $6 \times 1\frac{1}{4}$ inch flat bar iron or $2\frac{1}{2}$ inch round iron, or their equivalents. Has tight or loose pulleys, 24×6 inches, which should make 225 revolutions per minute.

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FIG. 516.

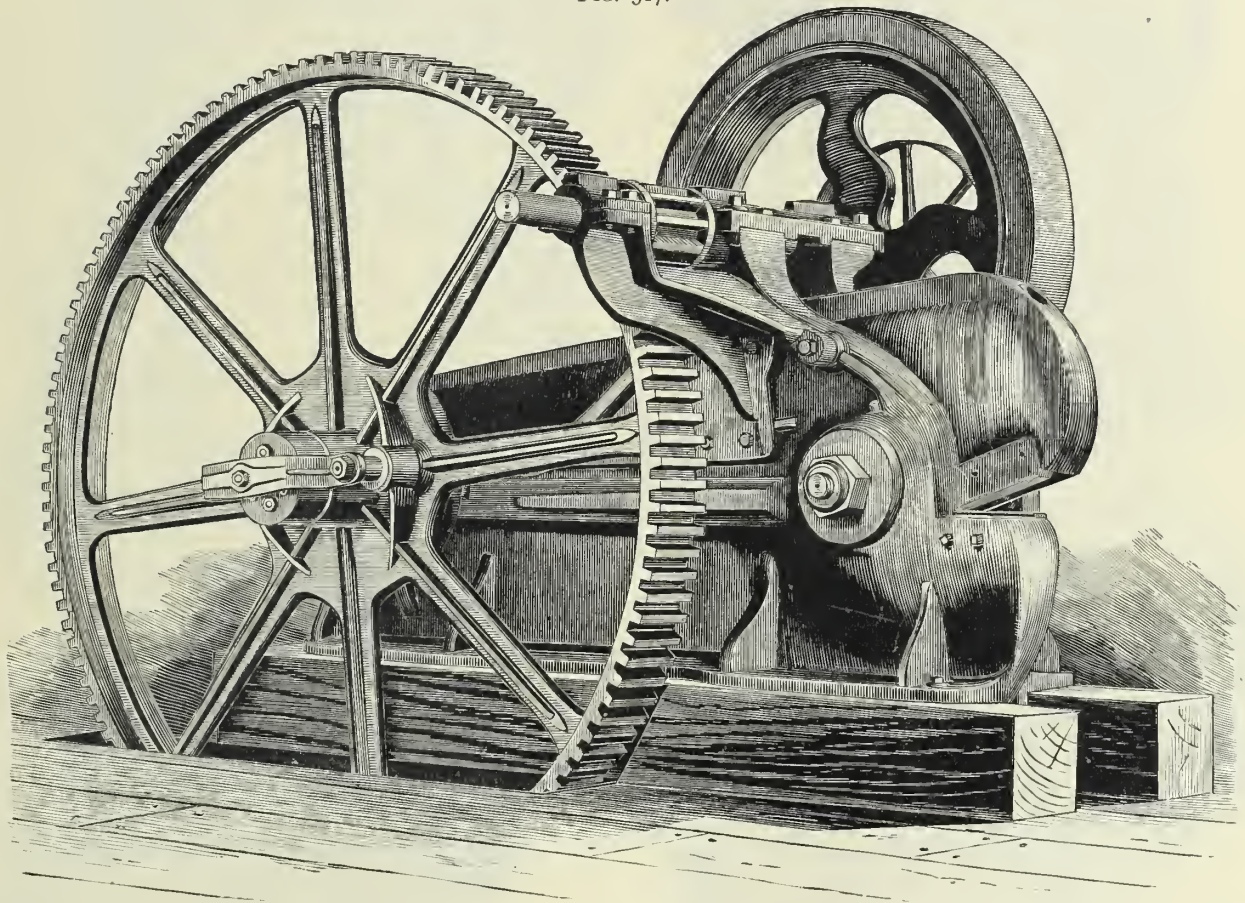


No. 3 C SHEAR.

No. 3 C Shear will cut plates $\frac{3}{4}$ inch or less in thickness, and of any width or any length. It will also cut angle iron 4 x 4 inches or less. Weight, 8500 pounds. Tight and loose pulleys, 24 x 8 inches. Price, \$

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FIG. 517.

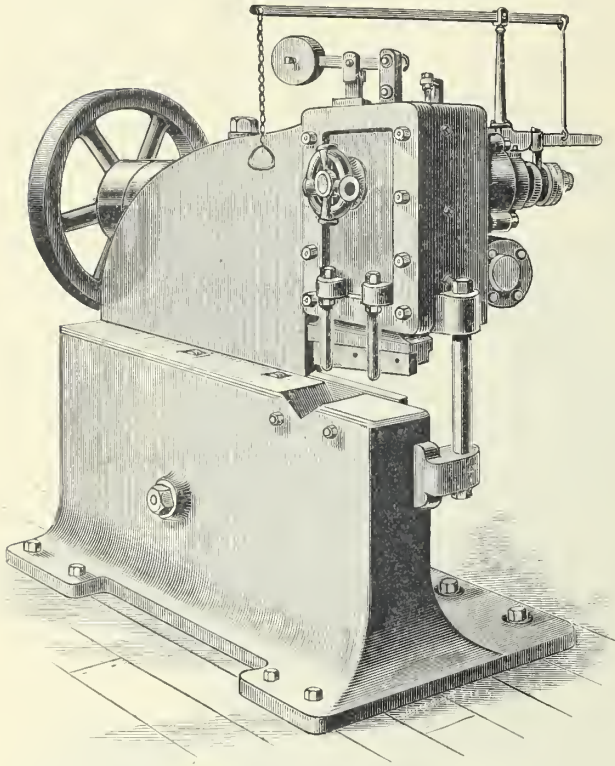


No. 7 F SHEAR.

No. 7 F Shear will cut 6 x 2 inches flat bar iron or 3 inches round iron, or their equivalents. Has tight and loose pulleys, 30 x 8 inches, which should make 350 revolutions per minute.

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FIG. 518.



WORM-GEARED UNIVERSAL POWER SHEAR.

THIS illustrates our Worm and Screw-Gear Universal Power Shear. It is used by boilermakers, safemakers, and all heavy sheet-iron workers. For cutting sheet, bar and angle iron it has no superior. It runs noiselessly and has anti-friction rollers on both sides so that heavy plates are moved easily and the scrap runs off readily.

The worm is made of hammered steel, and the worm-wheel of cast steel, both enclosed in oil-tight boxing. It is equipped with an automatic clutch, which may be operated from either side.

The machine is also made with gearing.

Length of blades, 12 inches.

Price, \$

Price without table, \$

SLITTING SHEARS.

MADE IN THREE SIZES.

No. 100 will slit sheet metal, either iron or brass, No. 16 gauge, into strips from $\frac{1}{2}$ to 12 inches wide. The cutters are 5 inches in diameter. The driving pulleys 30 inches in diameter and 5 inch face.

Weight, 475 pounds.

Price with pulley, \$

Price with tight and loose pulley, \$

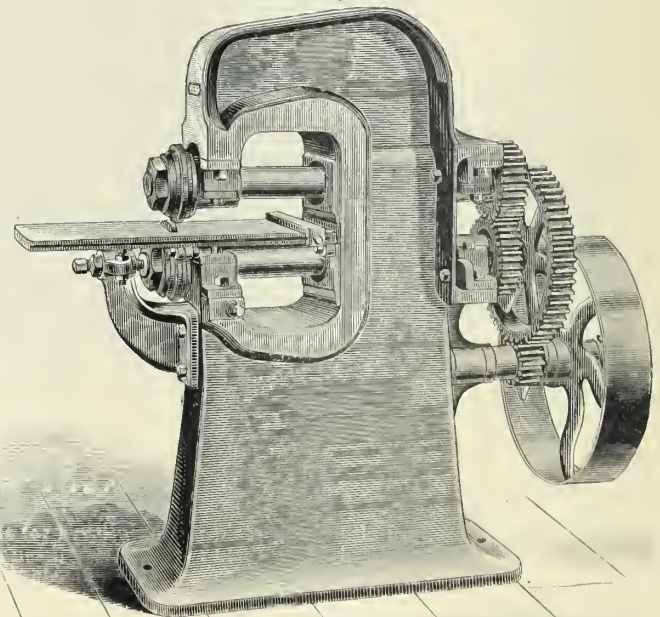
No. 200.—This machine has cutters $7\frac{1}{4}$ inches in diameter. It will slit to center of sheets 24 inches wide, No. 10 gauge. It is back-gear 4 to 1, and driven by pulley 30 inches diameter and 5 inch face.

Weight, 1800 pounds. Price, \$

No. 300.—Specially designed for heavy work, and will slit through the center of a 36 inch plate $\frac{3}{8}$ inch thick. The cutters are 11 inches in diameter. All necessary adjustments are provided to overcome the difficulties attendant upon the wearing and reduced diameters of the cutters. The machine is back-gear 6 to 1, and is driven by pulley 42 inches diameter and 8 inch face. Base of machine measures 24 x 40 inches. Extreme space required from front to back is about 6½ feet, and extreme height is 5 feet.

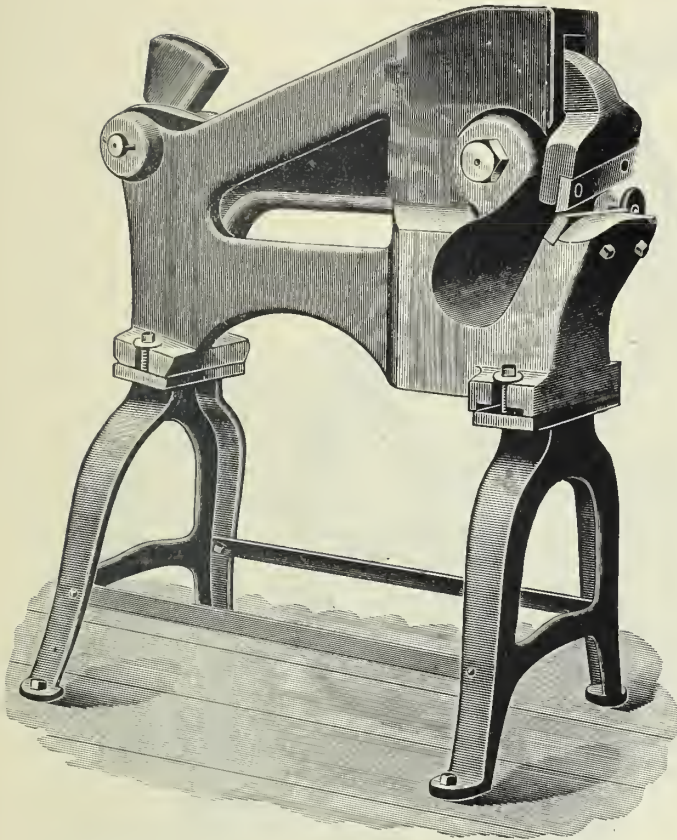
Weight, 4500 pounds. Price \$

FIG. 519.



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FIG. 520.



BELT POWER BEVELING SHEAR.

THIS SHEAR will bevel throat-sheets, the flanges of domes and sheets bent to a circle in addition to straight sheets. With it the operator can take a piece of plate in hand and trim it to almost any desired shape. There is no tipping up of the metal when cut, and all tendency to a side or twisting motion is overcome by the stop shown on side of machine. It is very strong and powerful and does its work easily. Shipped complete, with legs and knives for both flat and curved work. We make it in two sizes.

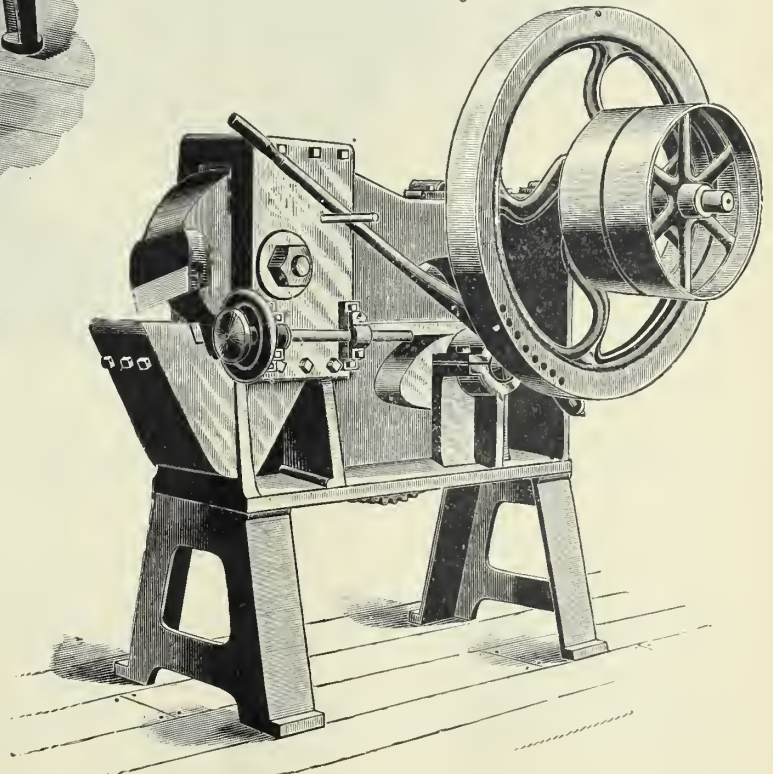
Size A bevels plates $\frac{1}{2}$ inch and less in thickness.
Weight, 3350 pounds.

Size B bevels plates 1 inch and less in thickness.
Weight, 5000 pounds.

HAND POWER BEVELING SHEAR.

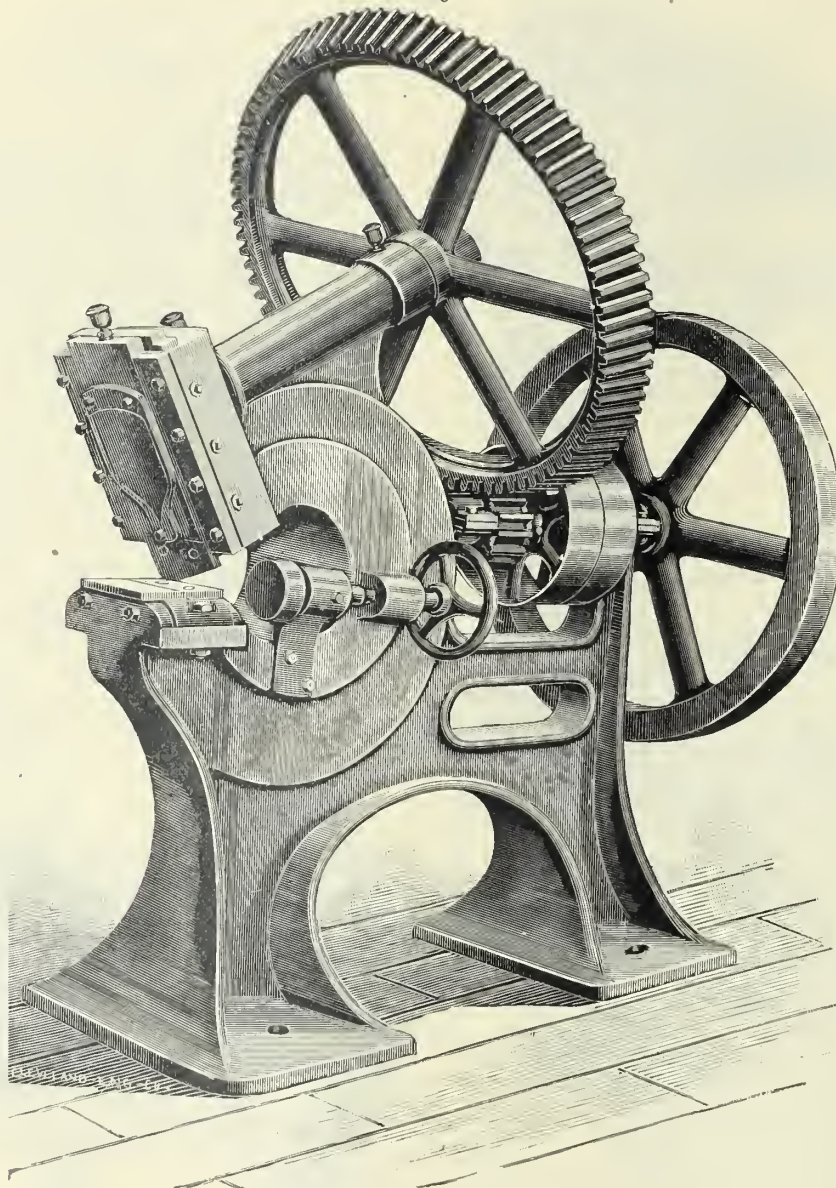
THIS illustration represents a beveling shear recently brought out by us, and made from new and improved patterns. It will bevel throat-sheets, the flanges of domes and sheets bent to a circle in addition to straight sheets. With it the operator can take a piece of plate in hand and trim it to almost any desired shape. There is no tipping up of the metal when cut, and all tendency to a side or twisting motion is overcome by the stop shown on side of machine. It is very strong and powerful and does its work easily. It bevels plates $\frac{1}{2}$ inch and less in thickness. Weight, 820 pounds. It is shipped complete, with legs, lever and knives for flat and curved work.

FIG. 521.



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FIG. 522.



BEVELING SHEARS.

THE above illustration represents a tool new to the trade for beveling boiler plate and angle iron. This machine is so constructed that the plunger is flush with the face of the head, and the shear blade is flush with the face of the plunger, giving a perfectly unobstructed view of the work, which is absolutely necessary to insure accurate work. We build this tool in two sizes, Nos. A and B.

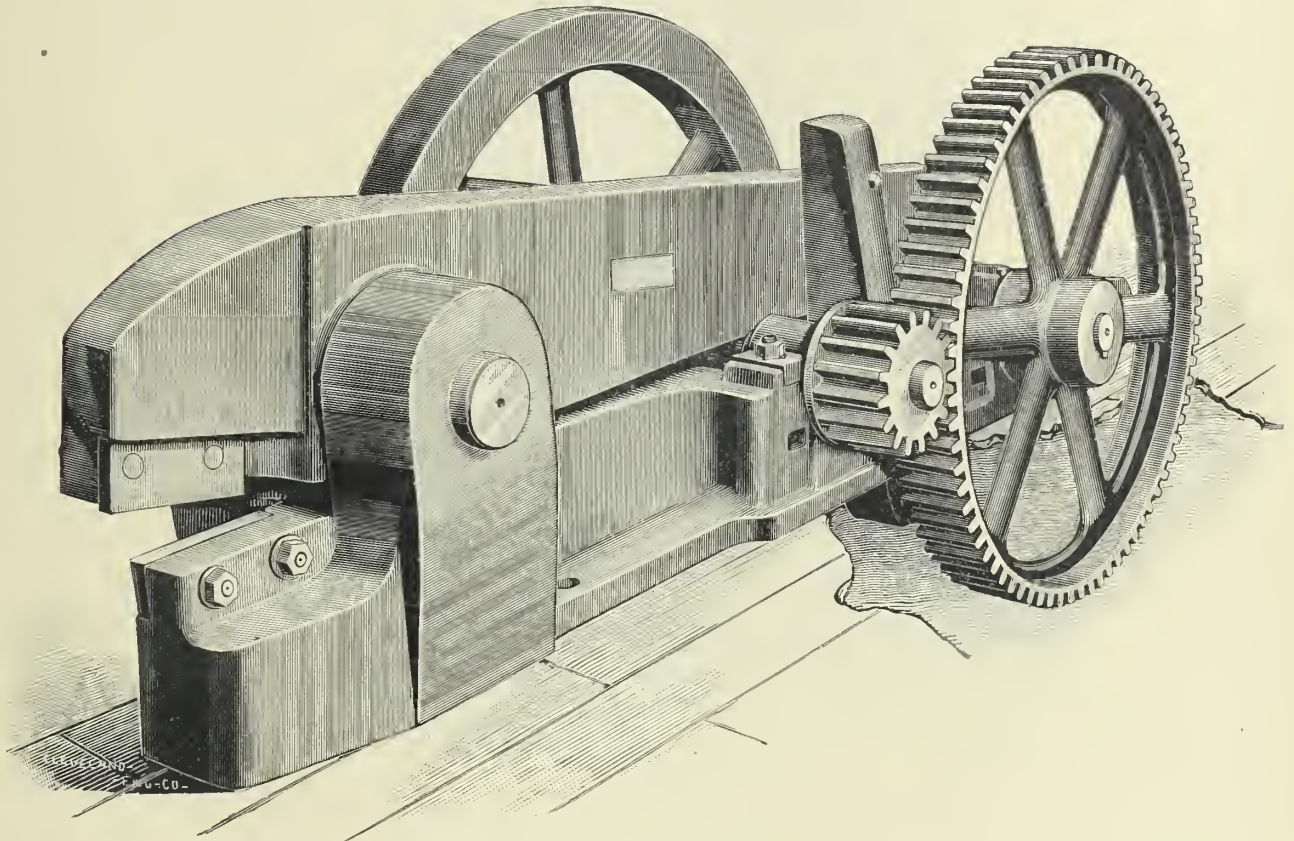
No. A has a capacity for shearing plates up to $\frac{5}{8}$ inch in thickness. Has tight and loose pulleys, 15 inches diameter, $4\frac{1}{2}$ inch face. For 4 inch belt. We recommend 200 revolutions per minute, which will give 30 strokes of the plunger.

No. B has capacity of beveling plates up to 1 inch in thickness. Has tight and loose pulleys, 20 inches diameter, $5\frac{1}{2}$ inch face. For 5 inches belt. We recommend 185 revolutions per minute, which will give 30 strokes of plunger.

No. A, weight,	Price, \$
No. B, weight,	Price, \$

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FIG. 523.



HEAVY ALLIGATOR SHEARS.

THE above illustration shows a simple but powerful machine for general cutting-off work in smith shops, rolling mills, etc.

We build this machine in different sizes, either steam or belt driven.

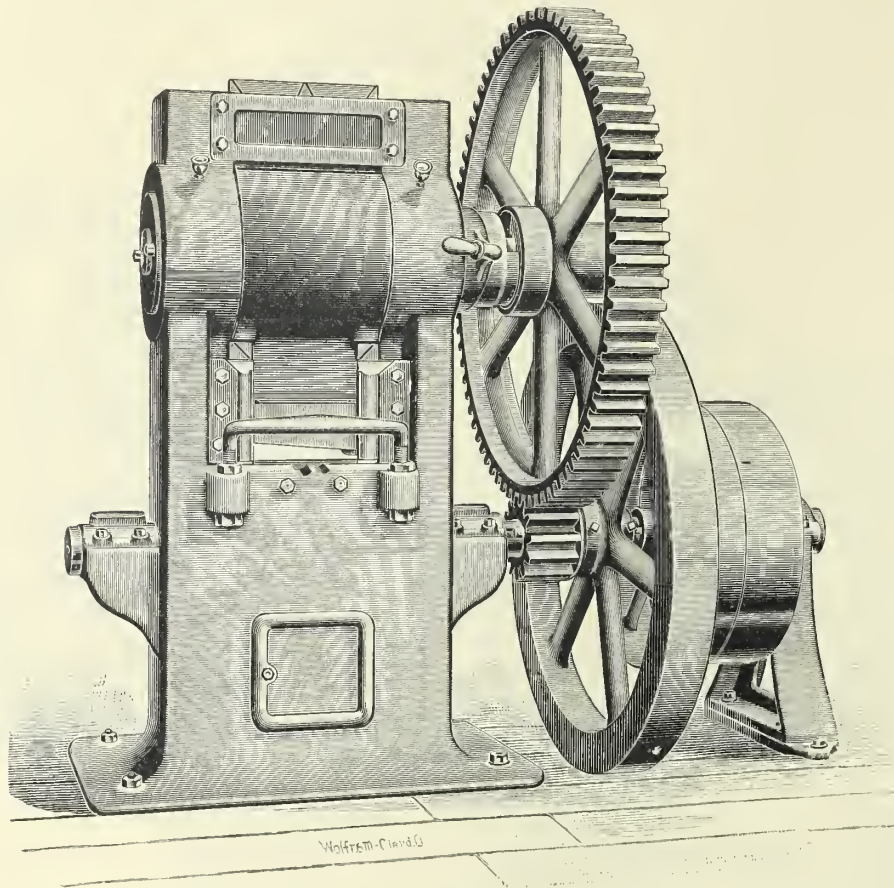
No. 1 machine will cut off a bar $4 \times \frac{3}{4}$ inch, or $1 \frac{1}{2}$ inches round.

No. 2 machine will cut off 8×1 inch bar, or 2 inches round, or $1 \frac{3}{4}$ inches square.

In writing, state size of bar to be cut and what shape, if special.

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FIG. 524.



BAR SHEARS.

No. 20.—With capacity to cut $1\frac{3}{4}$ inch square iron, or $1\frac{1}{2} \times 4$ inch flat iron, or 2 inch round iron cold. Has opening 3 x 6 inches at left hand side of machine for sliding bar through when cutting long pieces. Has pulleys 28 inches diameter for 6 inch belt, and should run at 190 revolutions, giving 30 strokes of plunger. Knives are 10 inches long.

Weight,

Price, \$

No. 30.—With capacity to cut $2\frac{1}{2}$ inch square iron, or 2×5 inch flat iron, or $2\frac{3}{4}$ inch round iron cold. Has opening 4 x 6 inches at left hand side of machine for sliding bar through when cutting long pieces. Has pulleys 30 inches diameter for 8 inch belt, and should run at 165 revolutions per minute, giving 30 strokes of the plunger. Knives 12 inches long.

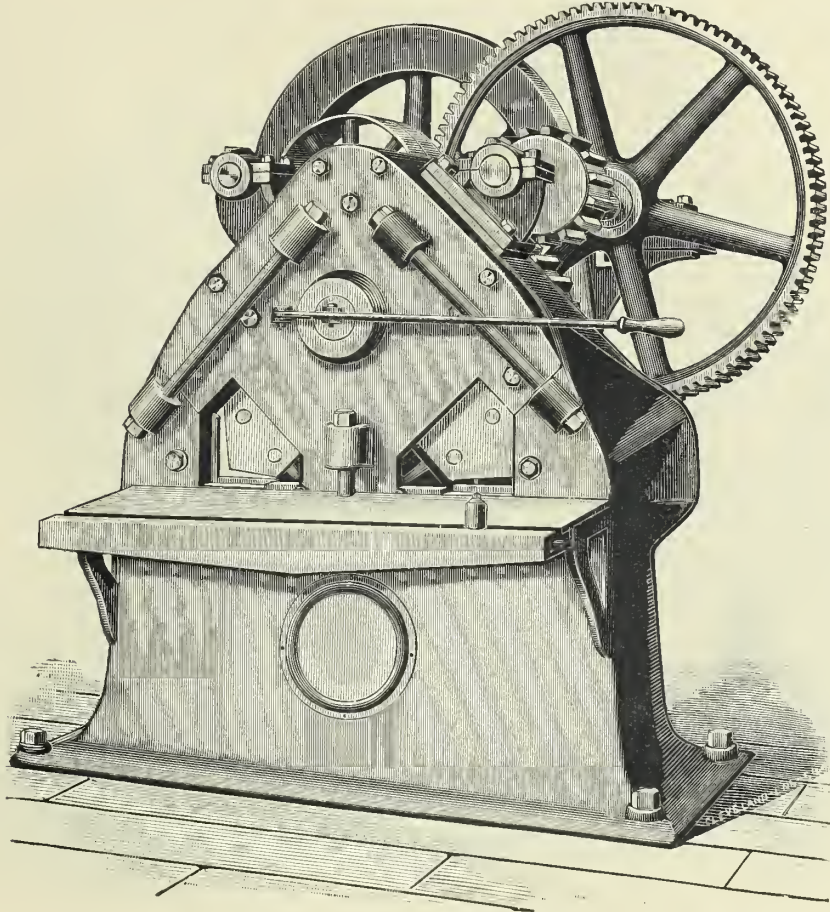
Weight,

Price, \$

Each machine is supplied with one set of knives. Duplicate knives, or knives of other shapes extra. Clutch motion can be arranged on either machine at slight extra cost.

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FIG. 525.



ANGLE SHEAR No. 20.

(MADE IN 2 SIZES.)

No. 20.—For cutting angles, square or any angle or bevel, from the smallest sizes up to light 6x6 inches. The knives being without shear, make a perfectly clean and true cut, furnished with iron table and gauge as shown. Tight and loose pulleys attached, with shifter to the machine. Pulleys 24 inches diameter and 6 inch face, and should make 200 revolutions per minute.

Weight,

Price, \$

No. 30.—For cutting angles, square or any angle or bevel from the smallest sizes up to 6x6x $\frac{3}{4}$ inch. The knives being without shear make a perfectly clean and true cut, furnished with iron table and gauge, and a heavy iron base plate making it rigid and self contained. Tight and loose pulleys attached with shifter to machine, pulleys 24 inches diameter, and 6 inch face, and should make 200 revolutions per minute. In writing, state largest angle to be cut.

Weight,

Price, \$

We can also furnish these machines to be driven by independent engine, or electric motor, if desired, and can also furnish this machine mounted on revolving base.

No. 20.—Weight, engine driven,
No. 20.—Weight with pulleys,
No. 30.—Weight with pulleys,

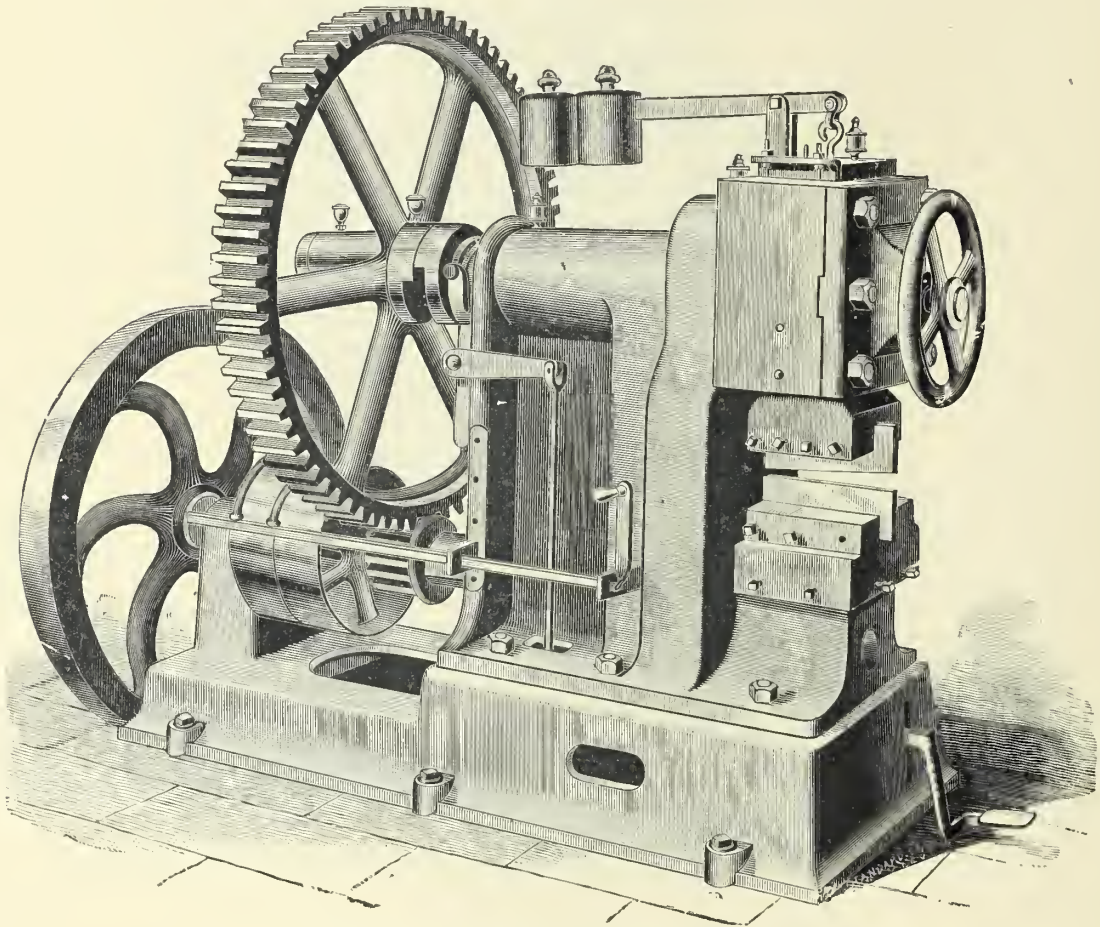
Price, \$
Price, \$
Price, \$

No. 20.—Weight, electric motor driven,
No. 30.—Weight, engine driven,
No. 30.—Weight electric motor driven,

Price, \$
Price, \$
Price, \$

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FIG. 526.



HEAVY PUNCH AND BAR SHEAR.

THIS MACHINE is designed for a great variety of work in bar iron, such as iron railing, fence, wagon, edge tool and bridge work. It is arranged for punching or shearing, and is easily changed from a punch to a shear or vice versa.

This machine will punch a $1\frac{1}{2}$ inch hole through 1 inch iron in the center of a 15 inch sheet, and shear 8 x 1 inch bar, or cut 2 inches round or square iron.

Tight and loose pulleys are 20 inches diameter, for a 5 inch belt, and should run at 175 revolutions, giving 30 strokes of plunger.

One set of either punching or shearing tools (and one punch and die one inch or less furnished with Punching tools) furnished with each machine—all others extra.

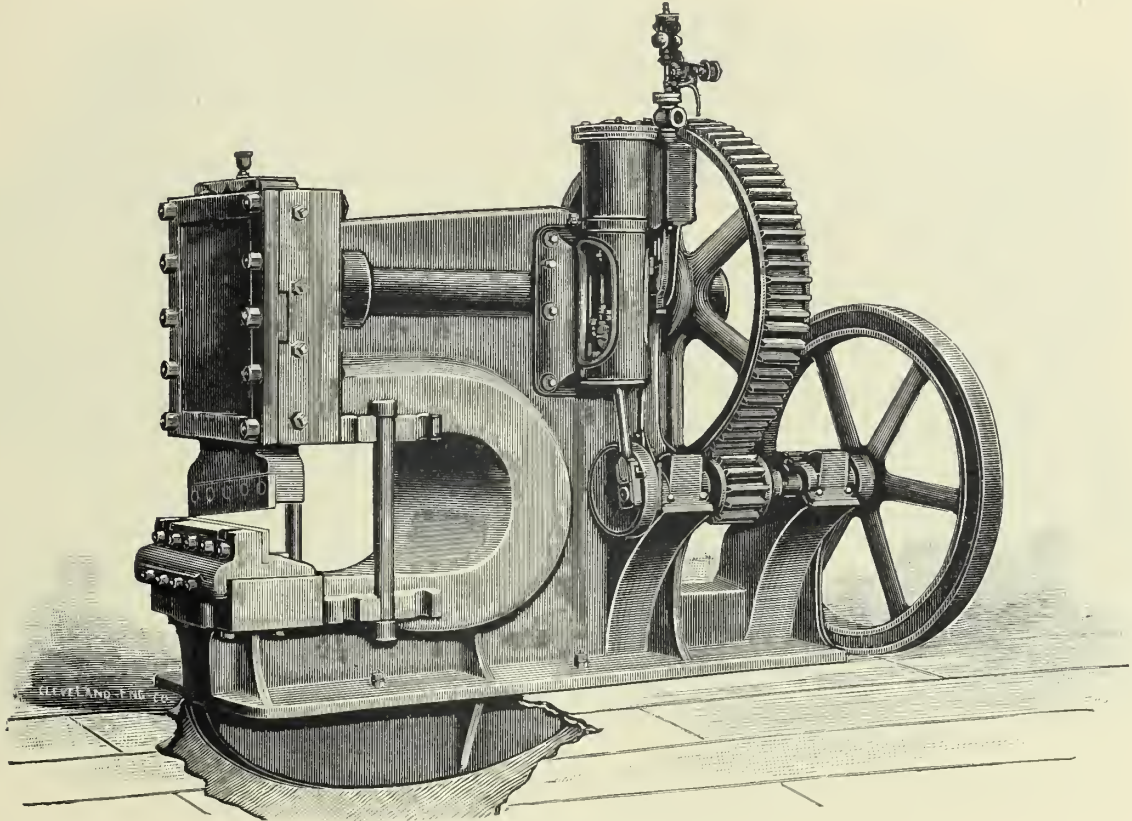
In writing state largest diameter of hole to be punched and greatest thickness of metal, or give size of bars to be cut.

Weight,

Price, \$

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FIG. 527.



SPLITTING AND TRIMMING SHEARS.

WITH 36 INCH THROAT.

THE above illustration represents a machine particularly adapted to the requirements of plate and sheet rolling mills, boiler shops and iron ship yards, for trimming, squaring and splitting long and wide sheets. The fact of having engine attached gives the additional advantage of being able to place it in any position or location.

The cut shows machine with 36 inch throat and capable of cutting up to $\frac{3}{4}$ inch plate at full depth of throat. Heavier plate can be cut when throat tie bars are in. The maximum length of shear blade is 26 inches.

This machine built with or without engine. Governor and pulleys furnished with engine.

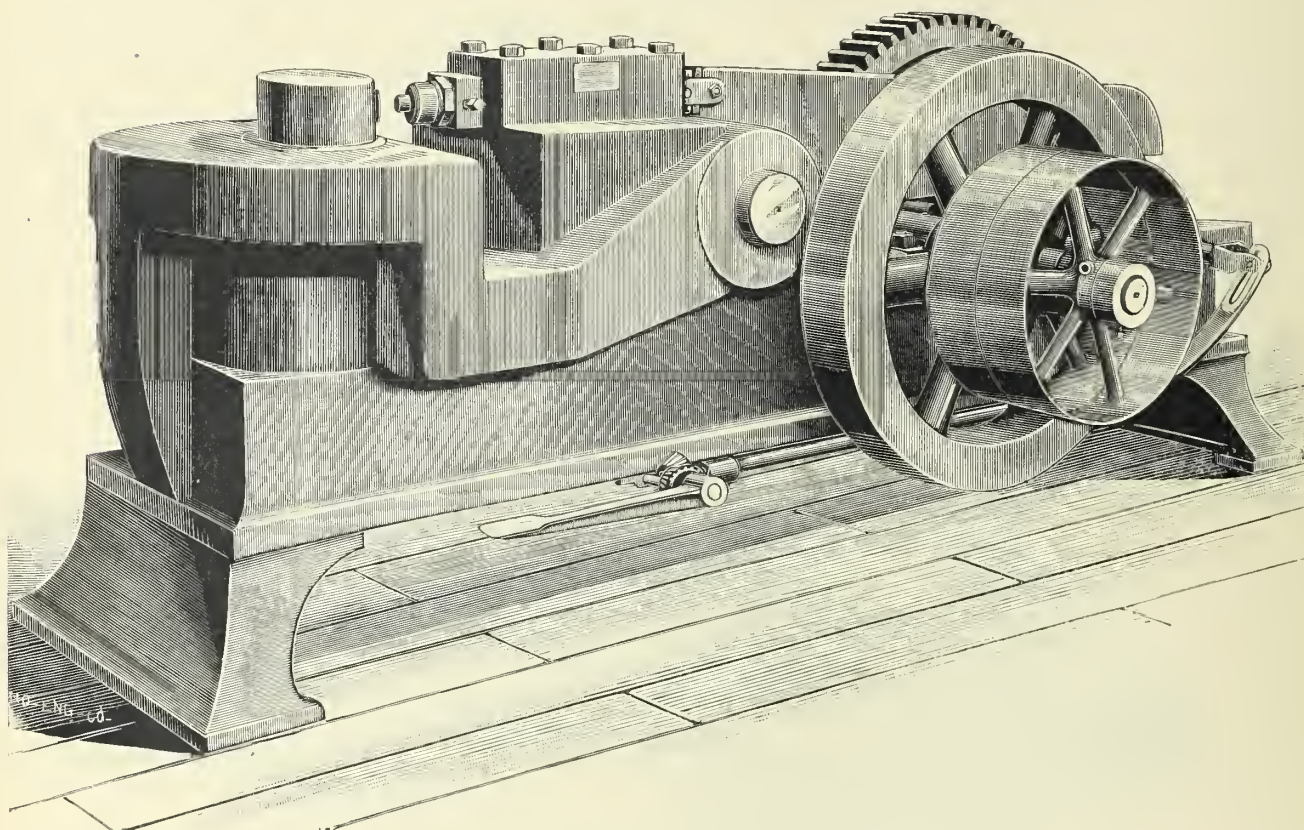
In writing state size of plate and thickness to be cut.

Weight,

Price, \$

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FIG. 528.



HORIZONTAL PUNCH.

THE above illustration represents a heavy and powerful tool for punching the flanges of boiler heads, I beams, angles, channels, bulb iron, etc., and is preferred by some (on account of the simplicity of parts) as against other designs. It is quite accessible for repairs, the parts being so arranged that any one can be removed without having to strip but one or two others at most.

This machine is capable of punching a 1 inch hole through one inch thickness in center of a 20 inch plate, and therefore can be used for punching I beams up to 20 inches within above capacity.

Machine has pulleys 24 inches diameter, 5 inch face, and should run at 140 revolutions per minute, which would give 30 strokes of plunger.

One punch and die, one inch or less, furnished with each machine—all others extra.

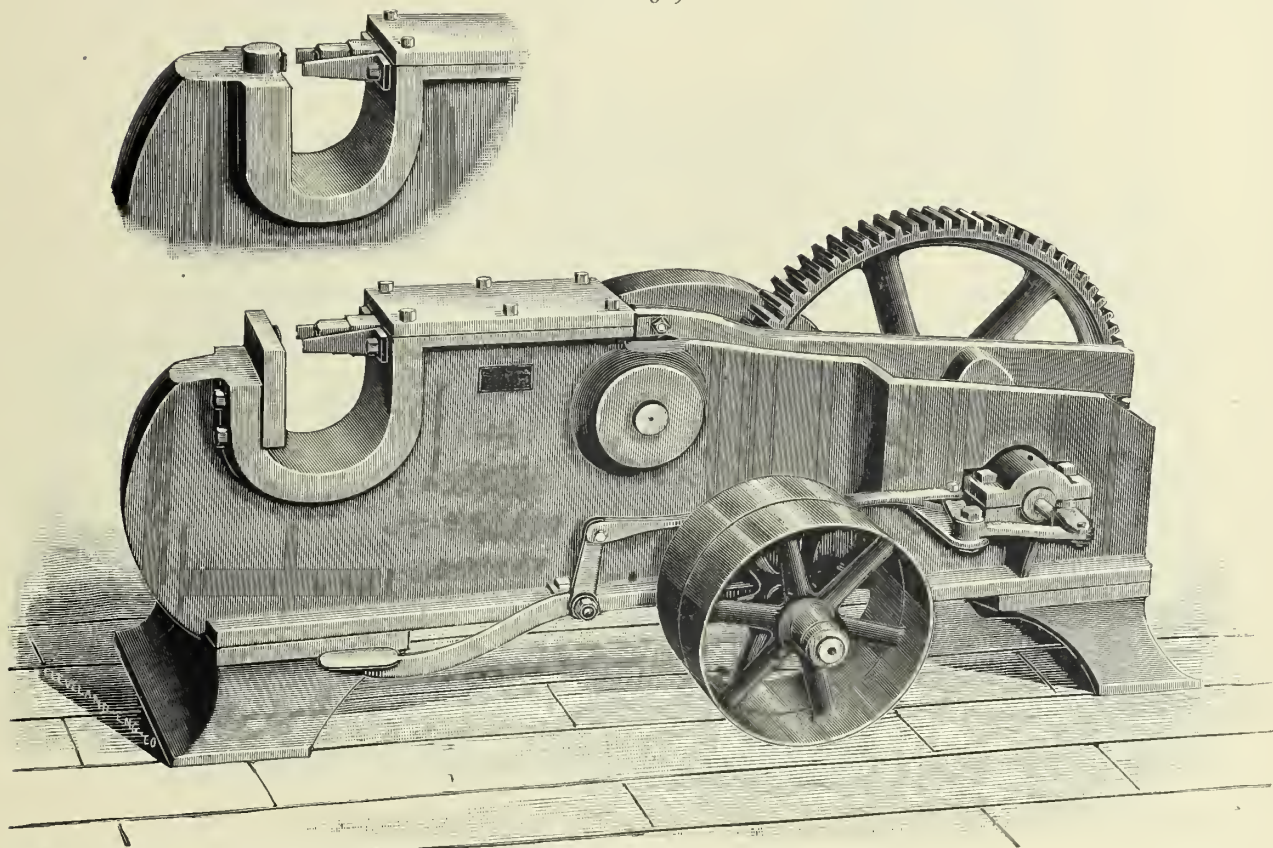
In writing state largest diameter of hole to be punched, and greatest thickness of metal.

Weight,

Price, \$

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FIG. 529.



LIGHT HORIZONTAL PUNCH.

THE above illustration represents a tool for punching boiler flanges, angles, channels, I beams, etc. It will punch a $\frac{7}{8}$ inch hole in $\frac{5}{8}$ inch iron in center of a 10 inch plate, and as close to edge of plate as size of die permits. This is a desirable tool for medium and rapid work in bridge and boiler shops.

Tight and loose pulleys are 18 inches in diameter, 5 inch face. We recommend 170 revolutions per minute, which gives 35 strokes of plunger.

We build this machine with round post, as shown in partial cut unless otherwise ordered.

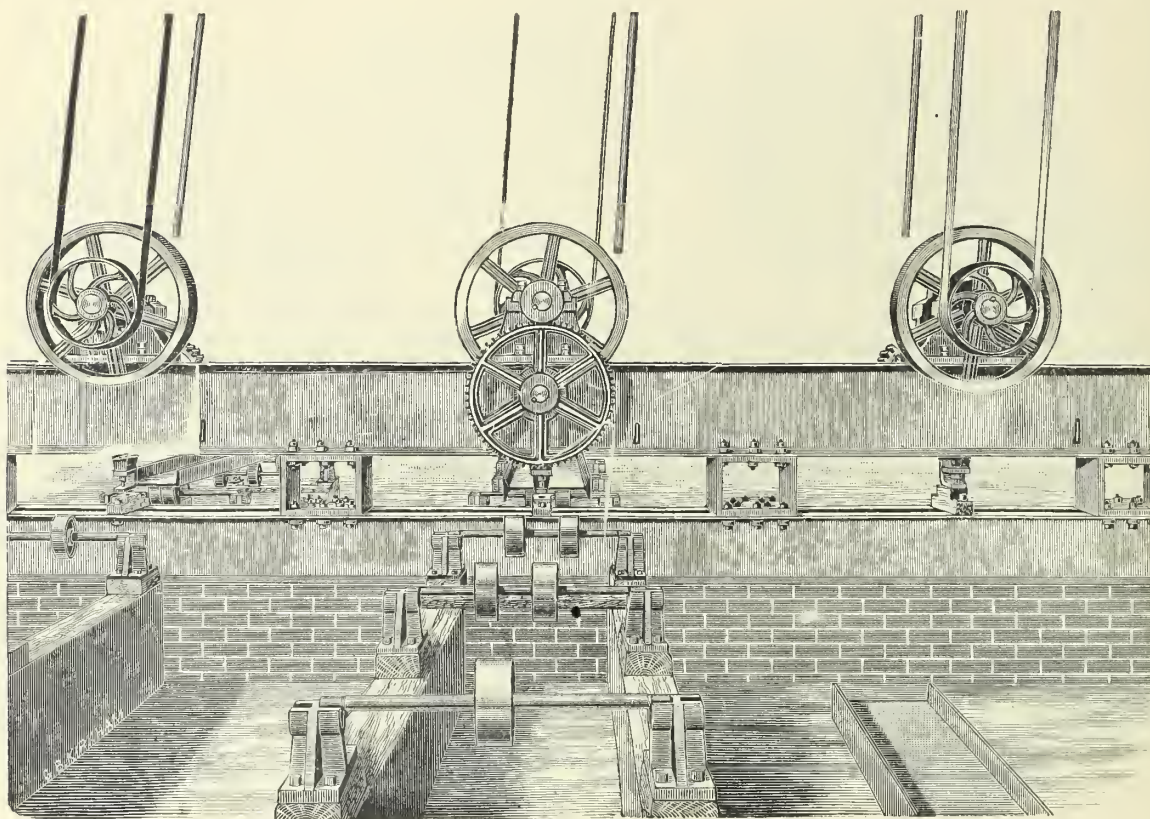
The plate die holder, as shown on machine, is designed for punching flanges of light angles, channels, I beams and various shapes of architectural and bridge iron. In writing state which style is preferred.

Weight,

Price, \$

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FIG. 530.



PATENT TRIPLE ARCHITECTURAL IRON PUNCH.

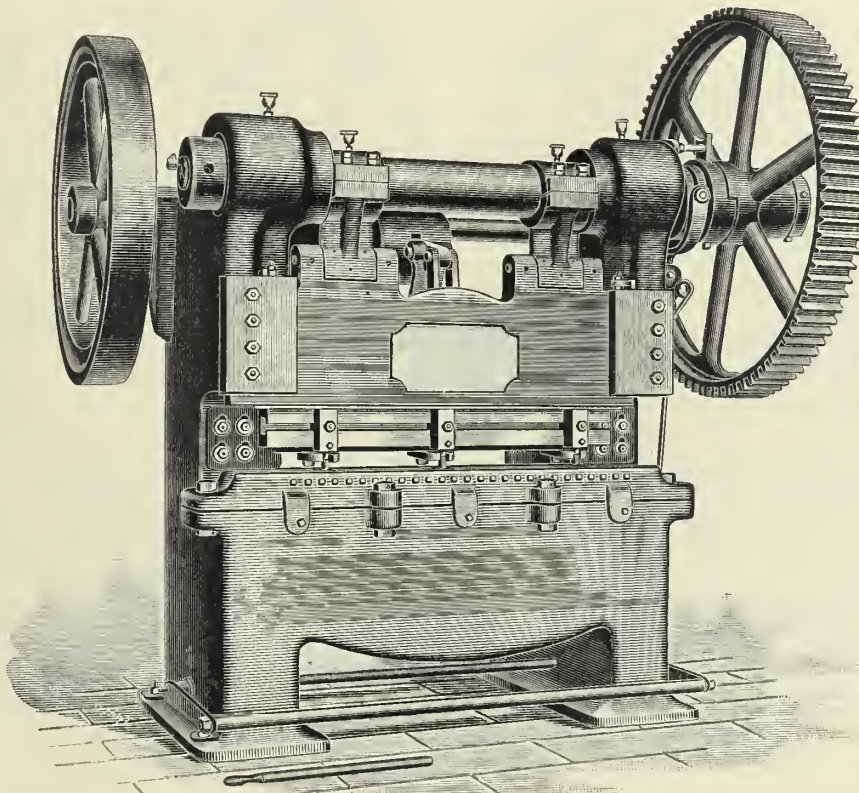
IN THIS ILLUSTRATION two views of a wrought-iron frame triple punch built for the rough work which has to be done by unskilled men in structural iron work, and which is not so liable to break if an extra hard beam chances to get in a job, as when an ordinary cast iron body is used. As is seen, the frame work is formed from one pair of heavy 20 inch steel beams, bottom and top, thoroughly built together with the plunger and guides situated between the upper pair. The small lever shown near the lower edge of upper beam is the stop motion of the plunger. In order to show both sides of the tool, the center punch has been, in the engraving shown, turned around. Some of its special features are its ability, simplicity, convenience, reliability, size of throat (68 inches between uprights by 14 inches high) its compactness without projecting parts to prevent freedom of movement of material, and its small cost. One has been running steadily for five years without showing any weakness, and punches 1 inch hole in 1 inch iron.

PRICES:

For single punch, including bearings and rolls,	-	-	-	-	\$500.00; weight, 5200 pounds.
For double punch, including bearings and rolls,	-	-	-	-	975.00; weight, 10000 pounds.
For triple punch, including bearings and rolls,	-	-	-	-	1450.00; weight, 14500 pounds.

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FIG. 531.



HEAVY MULTIPLE PUNCH.

THIS MACHINE is designed for punching at one stroke one or more complete rows of holes. It is especially adapted for tank work or any place where a large number of holes are to be punched in regular rows. The punches and dies are adjustable and may be set at any desired distances apart.

The machine is 48 inches between housings and has 8 inch throat. The slide is counterbalanced. Automatic stop is fitted to this machine without extra charge. Tight and loose pulleys are 22 inches diameter, 6 inch face and should make 175 revolutions per minute.

In writing give number and diameter of holes to be punched, distance between centers, thickness of material, etc.

Weight, Price, \$

GATE SHEAR.

We also furnish this machine arranged for shearing plates by substituting shear knives for punches shown in cut.

This machine will split or trim long plates up to $\frac{1}{4}$ inch thick, any distance from edge not exceeding 8 inches which is the depth of throat in side housings. Plates up to 46 inches wide may be passed through the housings when being sheared.

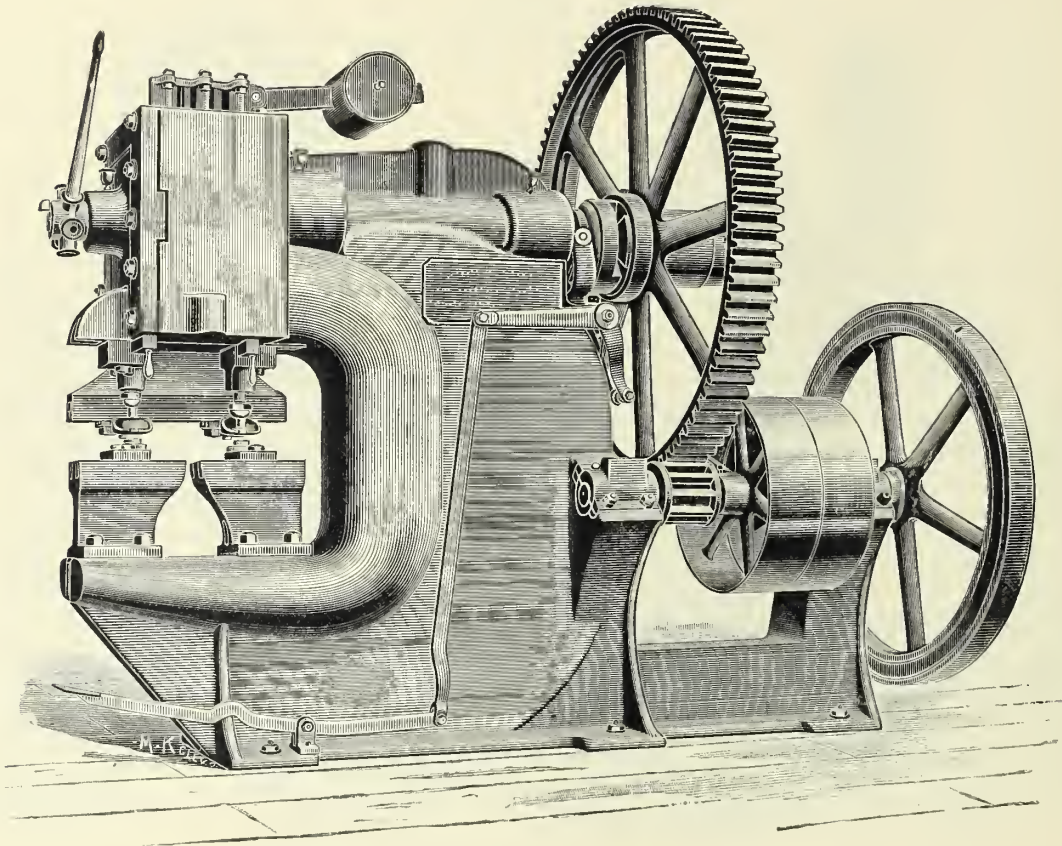
The shear is furnished with or without automatic hold down for clamping sheet as required. It has iron table not shown in cut, and has automatic stop.

In writing state width and thickness of sheet to be sheared and distance from edge of plate splitting is to be done.

Weight, Price, \$

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FIG. 532.



SPECIAL I BEAM AND CHANNEL PUNCH.

THIS machine is designed to meet the special requirements of bridge and iron ship builders for punching the webs and flanges of I beams, channels, bulb irons, angles and tee irons, etc. The punch holder blocks are made adjustable to punch from 3 inches to 24 inches centers, and this when punching two $1\frac{1}{8}$ inch holes through 1 inch iron or steel. For smaller holes the centers can be decreased for minimum and increased for maximum distances. As will be noticed, the punch blocks are each provided with gags for operating the punches separately or together. This is found advantageous where there are many staggering or irregular holes to be punched, and in fact are used in preference to the clutch for all work when convenient. It is provided with capstan, and bar for turning plunger shaft.

From the fact that it will punch the above mentioned size of holes at 24 inches centers, it will punch much heavier holes at center of plunger, also other punches can be attached and brought into use on lighter work.

Tight and loose pulleys are 30 inches diameter for a $6\frac{1}{2}$ inch belt, and should run at 180 revolutions per minute, giving 30 strokes of the plunger.

We furnish with each machine two sets of punching tools as per cut for punching holes $1\frac{1}{4}$ inches diameter or less—all others extra.

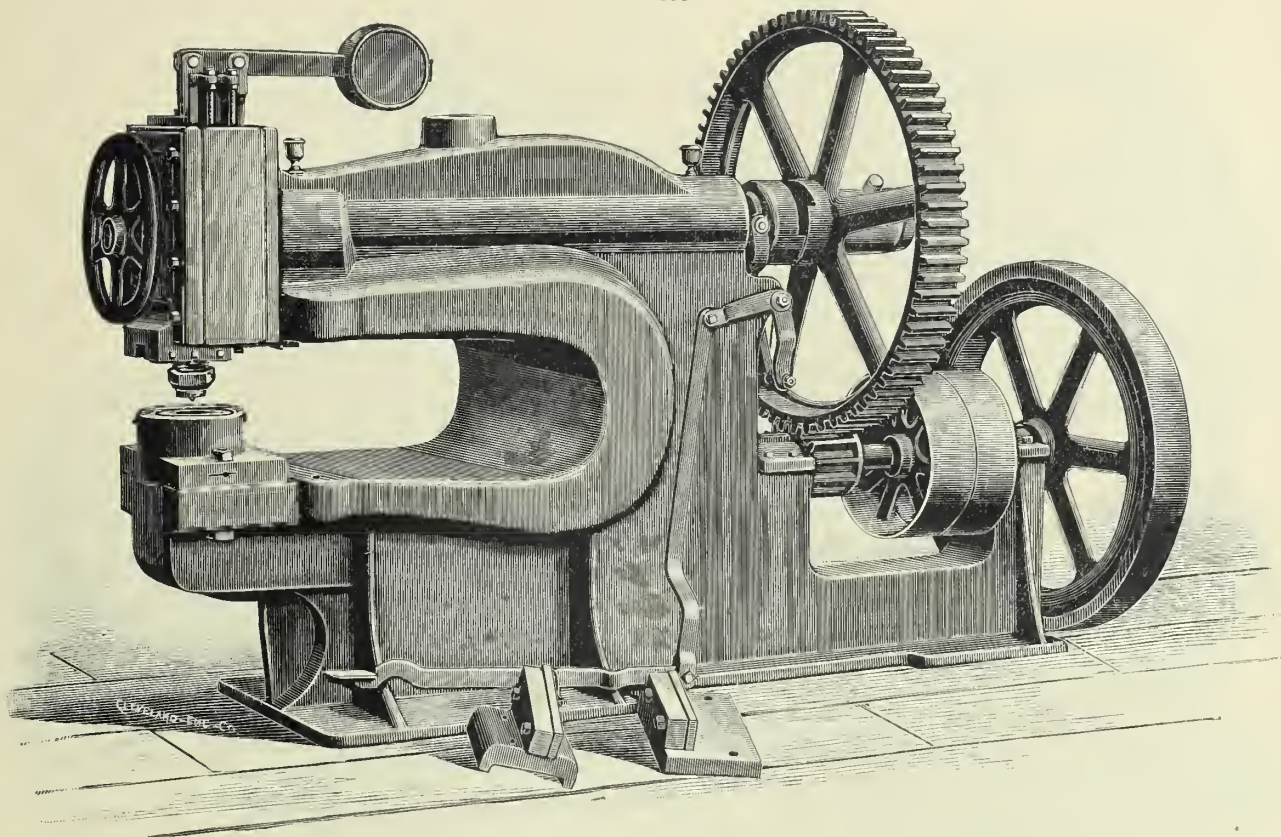
Other machines of the same design can be furnished by special agreement.

Weight,

Price, \$

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FIG. 533.



SINGLE PUNCH OR SHEAR WITH 36 INCH THROAT.

THE above illustration represents a machine particularly adapted to the requirements of boiler and bridge shops, etc., for punching holes in long and wide sheets and shearing same.

The illustration is of a machine with 36 inch depth of throat, and with capacity to punch a 1 inch hole through 1 inch thickness or shear $\frac{3}{4}$ inch plate.

This machine has an adjustable punch holder, which makes it possible to punch holes very close to edge of nose of punch, thereby adapting it to punching boiler flanges, etc., also increasing the depth of throat, thereby making it possible to punch to center of larger sheets. Punch should be in center of plunger though when punching large and heavy work. Throat tie bars should be used when punching and shearing heavier work than that above stated. By using spiral punches this machine will punch 4 inch holes through $\frac{1}{2}$ inch iron.

Tight and loose pulleys, 20 inches diameter, for a 5 inch belt, and should run 175 revolutions per minute, giving 30 strokes of plunger.

One punch and die, any size up to one inch, accompanies each machine.

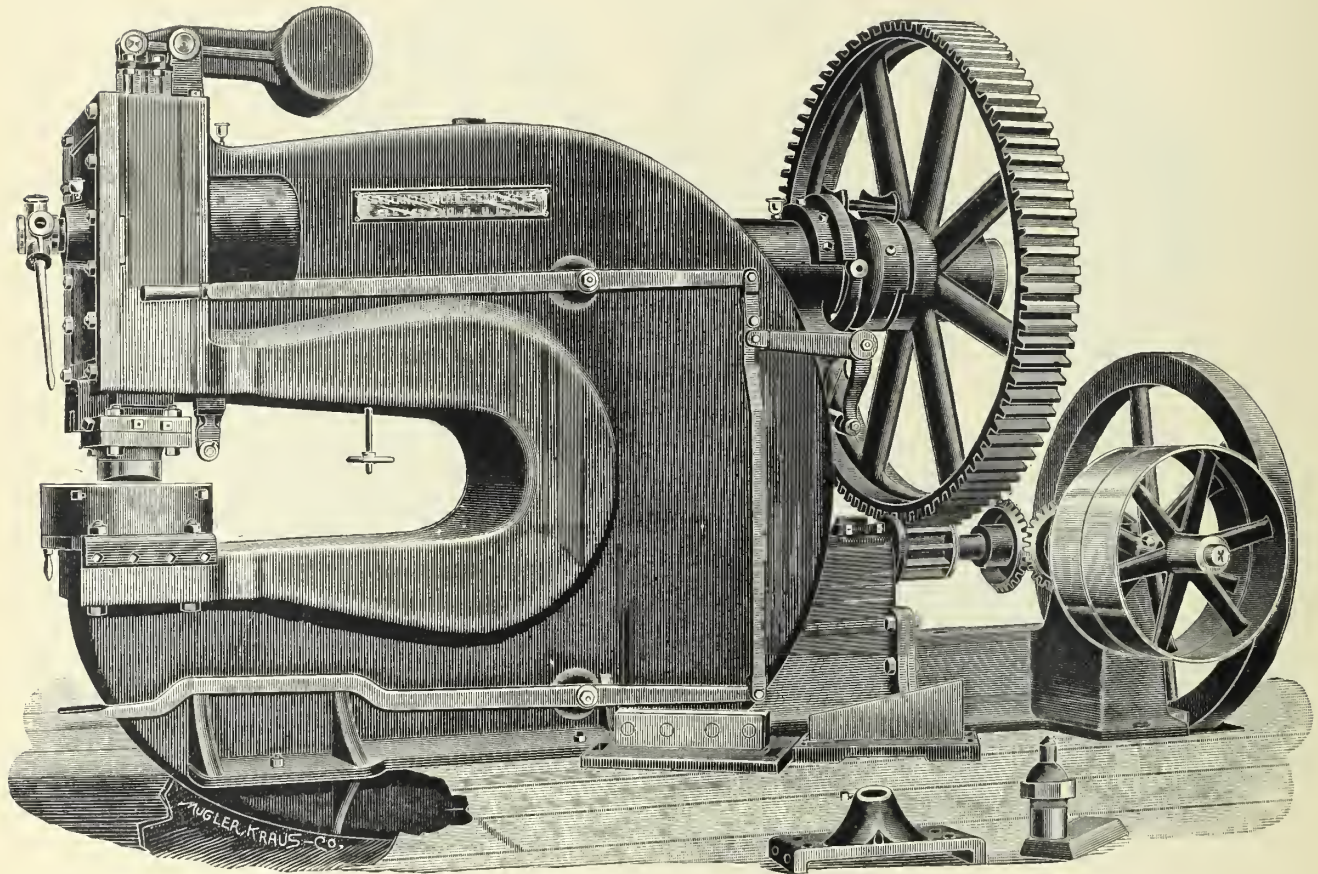
Has automatic stop, for stopping plunger when clear up, can be applied to any of these machines.

Weight,

Price, \$

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FIG. 534.



SINGLE PUNCH OR SHEAR WITH 48 INCH THROAT.

THIS machine is designed for heavy punching and shearing, and is especially adapted for use by boiler makers, bridge and ship builders. It is thoroughly well made and first-class in every particular, and can be readily changed from a punch to a shear. It has a capacity to punch 6 inch holes through $\frac{3}{4}$ inch steel plate at full depth of throat, or shear $1\frac{1}{4}$ inches plate.

Cut shows punch and die in position for punching man holes. It will punch $13\frac{1}{2} \times 7\frac{1}{2}$ inches man holes through $\frac{1}{2}$ inch steel plate. This man hole punch and die are furnished at an extra price. Adjustable punch holder and die holder shown on floor, and one punch and die 1 inch or less in diameter are furnished regularly with machine without extra charge.

Depth of throat with punch at center of sliding head is 48 inches. With our adjustable punch holder and die block, depth of throat may be increased to 52 inches. Automatic stop is furnished on this machine without extra charge.

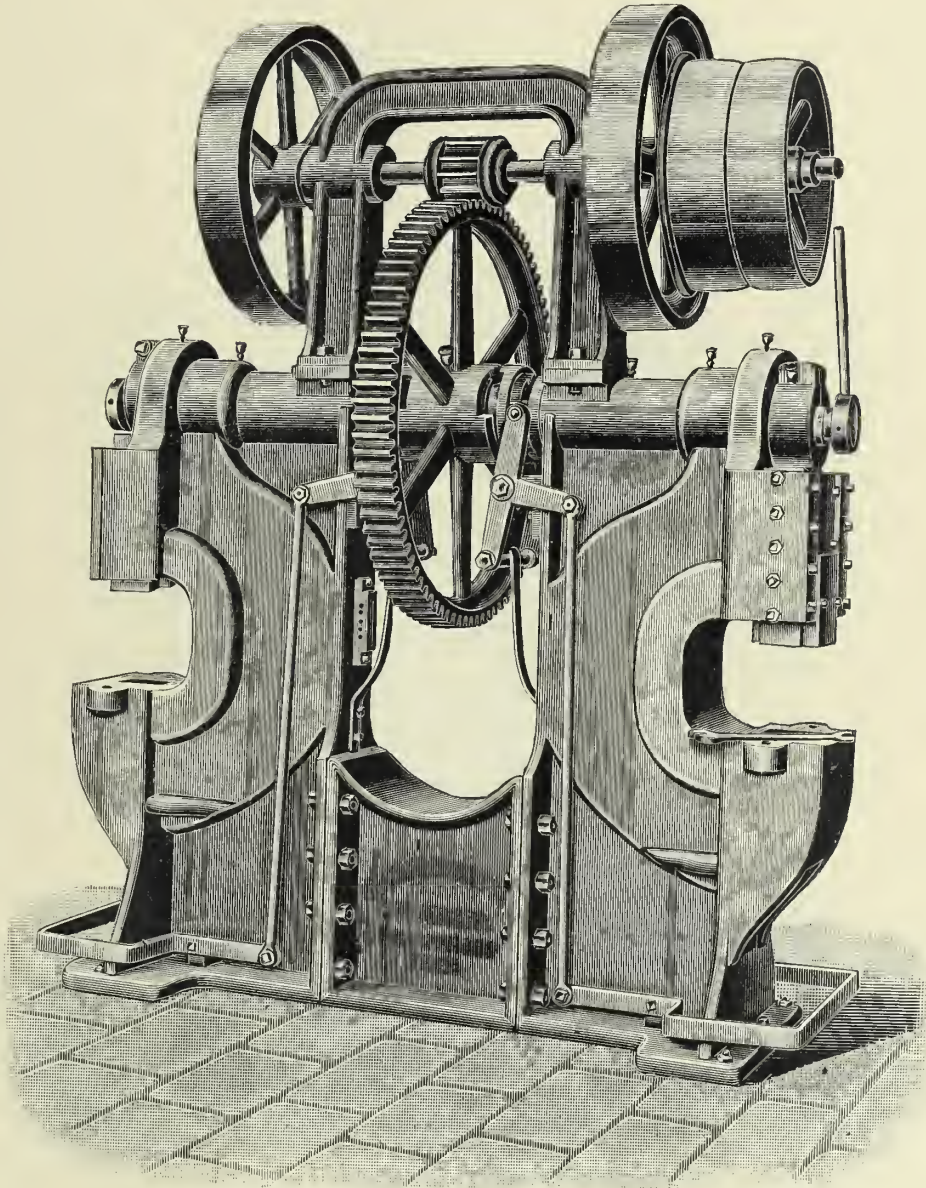
Tight and loose pulleys are 30 inches in diameter, $7\frac{1}{4}$ inch face. We recommend 175 revolutions per minute, which will give 18 strokes of the punch.

Weight,

Price, \$

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FIG. 535



DOUBLE PUNCHING AND SHEARING MACHINE.

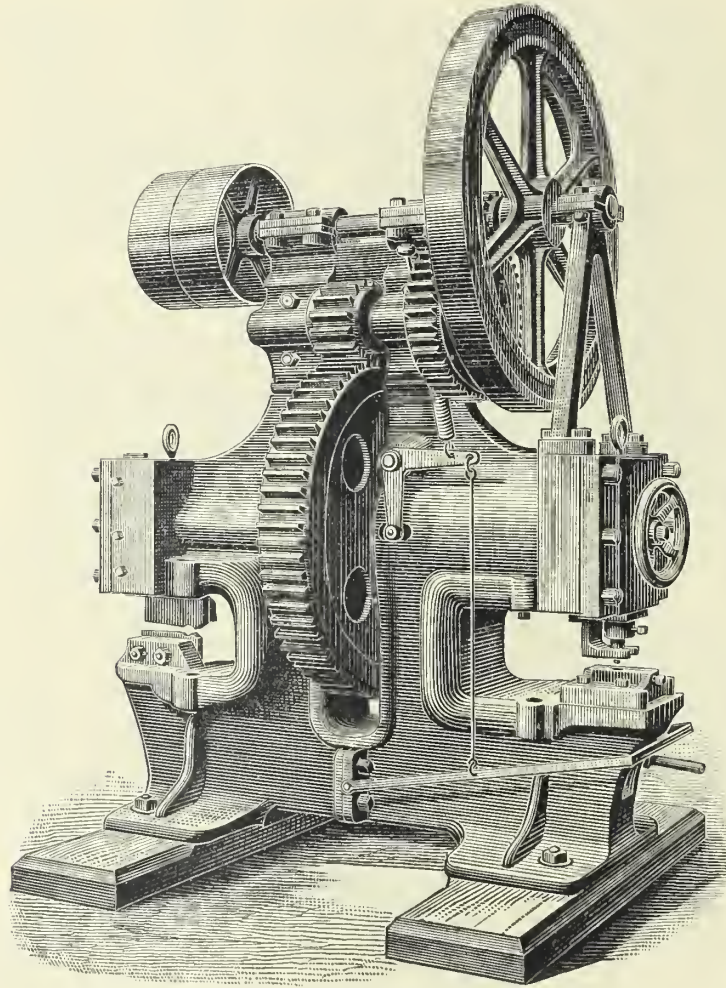
THE machine is especially designed for the machine trade and for all such work as requires a close adjustment. The sliding heads are operated by means of pitmans, on which the details have been carefully worked out, so that there is ample strength for heavy duty, as well as the greatest convenience in up and down adjustment, the sliding heads are unusually heavy, and are arranged with very long and wide bearings, having the usual taper shoe with screw adjustment. They are fitted up to receive single or multiple punch holders or shears. Each shaft is operated independently of each other by means of clutches with foot treadles, constructed in such a manner as to enable the operator to work the clutch from either side. The gearing is substantial and amply powerful. The shafts are of hammered steel, and run in phosphor bronze bushings in the pitmans.

The dimensions of this punch are as follows: Hole through bed, 6 x 8 inches; throat, from center of slide back, 7 inches, height of bed to slide at top of stroke and adjustment, 8 inches; stroke, 1 1/4 inch; special stroke also size of opening in bed and extra adjustment in pitman to order; standard adjustment, 1 inch; shafts, 4 1/2 inches in diameter; gearing, 86 to 12, 3 1/4 inch face, 1 1/4 in pitch; fly wheels, 28 x 4 1/2 inches; weight of fly wheels, each 350 pounds, revolutions, 175 per minute; pulleys, 18 x 4 1/2 inch face; thickness of iron punchable with 1 3/8 inch round die, 1/2 inch, shearing, 1/2 inch; weight of machine, about 4850 pounds; floor space, 24 x 66 inches.

Machines of any required capacity are constructed upon this design, or if preferred they may be fitted with friction clutches.

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FIG. 536.



PUNCHING AND SHEARING MACHINE.

THE illustration shows a combined Punching and Shearing Machine. It is especially adapted for use in architectural iron works, ship building and boiler shops. It is substantially built, has a clutch attachment, by which the punch can be worked independent of the cutter and can be run at any desired speed.

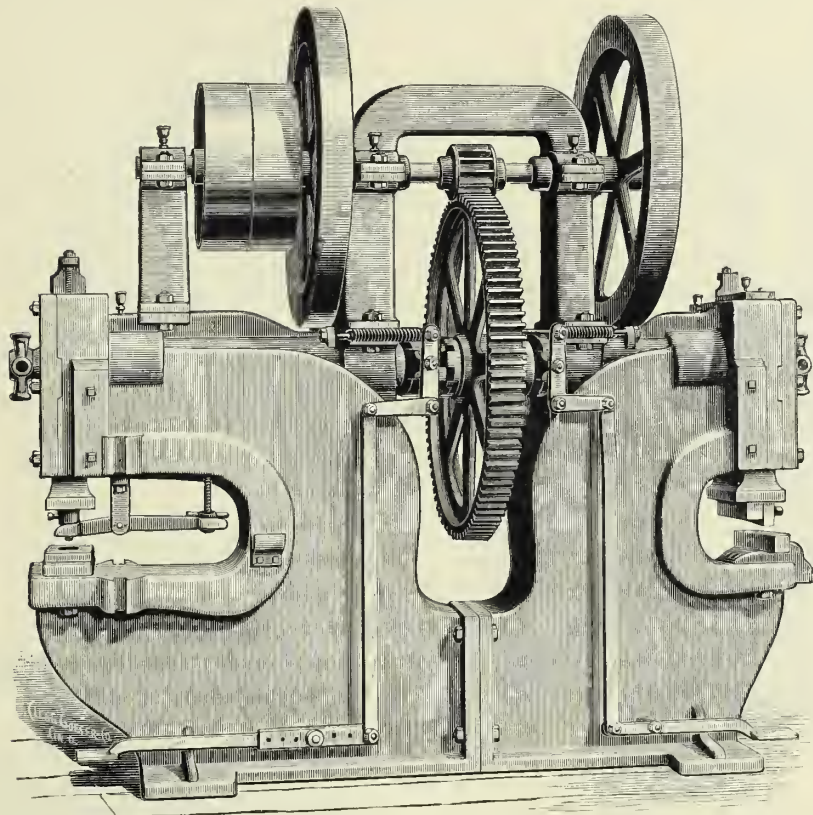
It is capable of cutting 6 x 1 inch cold iron, 1½ inch round iron, and will punch 1 inch hole in 1 inch flat or plate iron.

Depth of throat, 15 inches.

Total weight of machine, about 11500 pounds.

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FIG. 537.



No. 2 DOUBLE PUNCH OR SHEAR.

THE above illustrates our No. 2 Double Punch, which we build in different sizes, from 10 to 36 inch throats, even or uneven depths, and either side used independently of the other.

The tools for this machine are interchangeable, though one side is generally used for punching, and the other for shearing. We build it with engine, if desired. Price extra, \$

To find either weight or price of machine with uneven throats, add the weights or prices of the sizes wanted and divided by two.

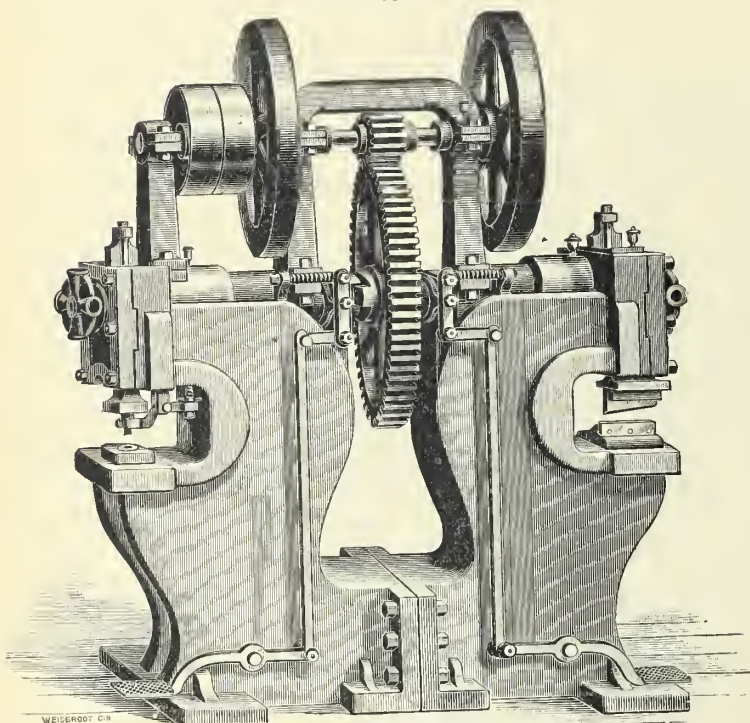
Each machine is provided with one die block, one punch socket, one punch, one die, and one set of shears. Prices on special tools quoted on application

Speed, 180 revolutions.

Depth of Throat.	Will Punch.	Will Cut Flat	Will Cut Round	Weight Single.	Price.	Weight Double.	Price.
12 inches	1x1 inch	$\frac{7}{8}$ x6 inches	1 $\frac{5}{8}$ inch	6700 pounds		11000 pounds	
16 inches	1x1 inch	$\frac{7}{8}$ x6 inches	1 $\frac{1}{2}$ inch	7350 pounds		12000 pounds	
20 inches	$\frac{7}{8}$ x $\frac{7}{8}$ inch	$\frac{7}{8}$ x6 inches	1 $\frac{1}{2}$ inch	7875 pounds		13500 pounds	
24 inches	$\frac{3}{4}$ x $\frac{3}{4}$ inch	$\frac{7}{8}$ x6 inches	1 $\frac{3}{8}$ inch	8500 pounds		14750 pounds	
30 inches	$\frac{3}{4}$ x $\frac{3}{4}$ inch	$\frac{3}{4}$ x6 inches	1 $\frac{1}{4}$ inch	9450 pounds		15900 pounds	
36 inches	$\frac{3}{4}$ x $\frac{3}{4}$ inch	$\frac{3}{4}$ x6 inches	1 $\frac{1}{4}$ inch	11250 pounds		18250 pounds	

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FIG 538.



WORM AND SCREW-GEARED POWER PUNCH
AND SHEAR.

ABOVE illustration represents our Combined Punch and Shear, which embodies a number of new features. The housing is made all in one piece instead of being bolted together, as is the case in other machines of this class. It is run by a steel worm and cast steel worm wheel, with all working parts encased. This produces a machine powerful, compact, and of steady motion. It is built in three sizes. No. 1 runs 16 revolutions, Nos. 2 and 3 run 22 revolutions to each stroke of the slide, and at this high speed the machine runs with 25 per cent. less belt power than any other punch and shear of the size in the market. Each is supplied with one punch socket, one punch, one die, one die rest, one pair of shears for bar iron, and one pair for round iron. Extra tools furnished at reasonable prices.

No.	8 Inch Throat.			15 Inch Throat.			Weight.	Price.
	Will Punch.	Will Cut Round.	Will Cut Flat.	Will Punch.	Will Cut Round.	Will Cut Flat.		
1	$\frac{3}{8} \times \frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8} \times 3$	$\frac{3}{8} \times 5-16$	$\frac{3}{4}$	$\frac{1}{4} \times 2\frac{1}{2}$	2000	
2	$\frac{1}{2} \times \frac{1}{2}$	$\frac{7}{8}$	$\frac{3}{8} \times 4$	$\frac{3}{8} \times \frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8} \times 3$	2600	
3	$\frac{5}{8} \times \frac{5}{8}$	1	$\frac{1}{2} \times 4$	$\frac{1}{2} \times \frac{7}{8}$	$\frac{3}{4}$	$\frac{3}{8} \times 4$	3200	

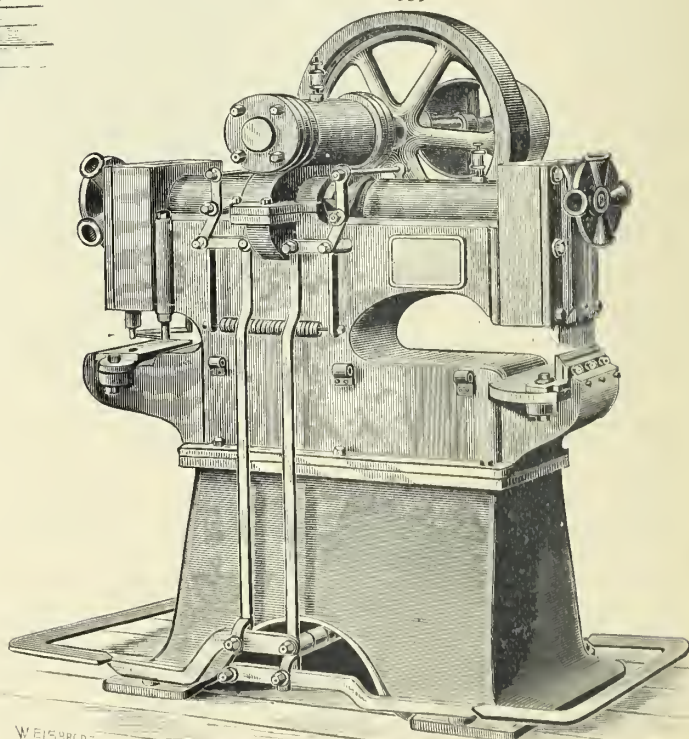
No. 5 DOUBLE PUNCH OR SHEAR MACHINE.

THIS represents our No. 5 Double Punch or Shear Machine, which we build in different sizes, even or uneven throats, from 7 to 21 inches. Both sides may be used at once, or either side independently of the other, though one is generally for punching, and the other for shearing. Each machine is supplied with one die block, one die holder, one punch socket, one punch and die, one die rest, one set of shear blocks and shears.

Speed, about 180 revolutions.

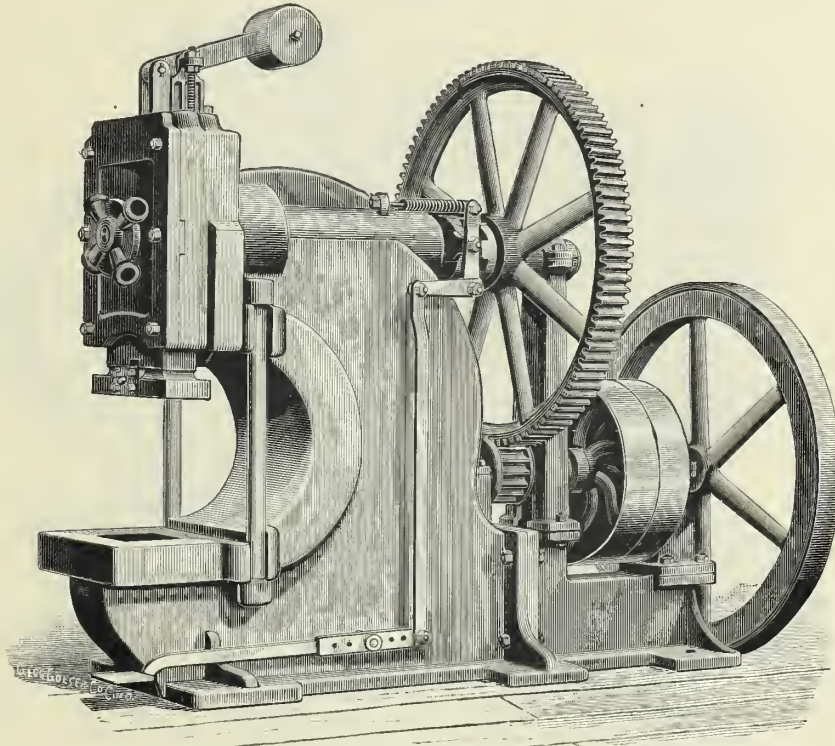
Depth of Throat.	Will Punch.	Will Cut Flat.	Will Cut Round.	Weight Single.	Price.	Weight Double.	Price.
6 inch	$\frac{5}{8} \times \frac{5}{8}$	$\frac{5}{8} \times 3$	1 $\frac{1}{2}$	2300		3800	
8 inch	$\frac{5}{8} \times \frac{5}{8}$	$\frac{5}{8} \times 3$	1 $\frac{1}{2}$	2500		4200	
10 inch	$\frac{5}{8} \times \frac{1}{2}$	$\frac{1}{2} \times 3$	1	2750		4600	
12 inch	$\frac{5}{8} \times \frac{1}{2}$	$\frac{1}{2} \times 3$	1	3000		5050	
15 inch	$\frac{1}{2} \times \frac{1}{2}$	$\frac{3}{8} \times 3$	$\frac{7}{8}$	3250		5600	
18 inch	$\frac{1}{2} \times \frac{1}{2}$	$\frac{3}{8} \times 3$	$\frac{7}{8}$	3500		5875	
21 inch	$\frac{3}{4} \times \frac{3}{8}$	$\frac{3}{8} \times 3$	$\frac{7}{8}$	3800		6500	

FIG. 539.



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FIG. 540.



No. 0 HEAVY SINGLE PUNCH OR SHEAR MACHINE.

THIS illustrates our No. 0 Heavy Single Punch or Shear Machine with high opening to admit beams and girder iron. We build it both double and single, from 15 to 42 inches in depth. Our patterns are arranged to suit any of this class of work. It is constructed of the best material throughout. The bearings are of phosphor bronze; the clutch is made of cast steel, and the gearings of the highest grade. We furnish with same one die block, one die rest, one punch socket, one die and punch, one set of shear blades. Prices on extra or special tools quoted on application. This machine may be built with engine if desired.

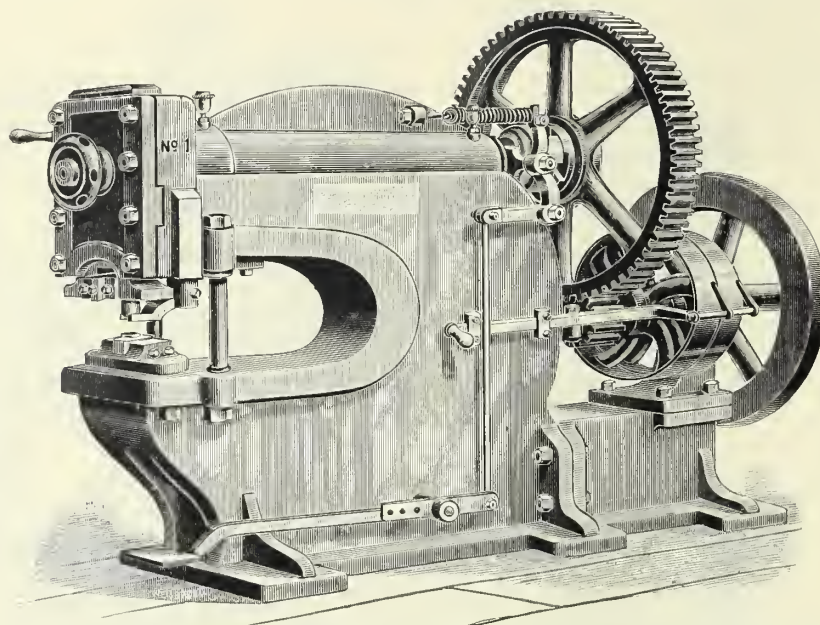
Depth of Throat.	Will Punch.	Will Cut Flat.	Will Cut Round.	Weight Single.	Price for engine, \$		Speed, 180 revolutions.	
					Price.		Weight Double.	Price.
15 inches	2 x 1 inch	1 1/8 x 8 inches	2 inches	12000 pounds			19500 pounds	
18 inches	1 7/8 x 1 inch	1 x 8 inches	2 inches	12600 pounds			20700 pounds	
21 inches	1 3/4 x 1 inch	1 x 8 inches	1 7/8 inches	13200 pounds			22500 pounds	
24 inches	1 3/8 x 1 inch	1 x 8 inches	1 3/4 inches	14000 pounds			24000 pounds	
30 inches	1 1/4 x 1 inch	7/8 x 8 inches	1 1/2 inches	14900 pounds			26000 pounds	
36 inches	1 x 1 inch	7/8 x 8 inches	1 1/2 inches	15800 pounds			27800 pounds	
42 inches	1 x 1 inch	3/4 x 8 inches	1 1/4 inches	17100 pounds			29500 pounds	

Our No. 1 Punch is of the same type as No. 0, and made in the same sizes, single and double, with even or uneven depths of throat.

Depth of Throat.	Will Punch.	Will Cut Flat.	Will Cut Round.	Weight Single.	Price.	Weight Double.	Price.
12 inches	1 3/8 x 1 inch	1 x 8 inches	1 3/4 inches	9600 pounds		15500 pounds	
16 inches	1 1/4 x 1 inch	1 x 6 inches	1 1/2 inches	10100 pounds		16500 pounds	
20 inches	1 1/8 x 1 inch	1 x 6 inches	1 1/2 inches	10700 pounds		17600 pounds	
24 inches	1 x 1 inch	7/8 x 6 inches	1 1/2 inches	11500 pounds		18900 pounds	
30 inches	1 x 7/8 inch	7/8 x 6 inches	1 3/8 inches	13400 pounds		21000 pounds	
36 inches	7/8 x 7/8 inch	3/8 x 6 inches	1 1/4 inches	14200 pounds		22000 pounds	
40 inches	7/8 x 3/4 inch	3/4 x 6 inches	1 1/4 inches	15500 pounds		24000 pounds	

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FIG. 541.



No. 2 BOILER PUNCH OR SHEAR.

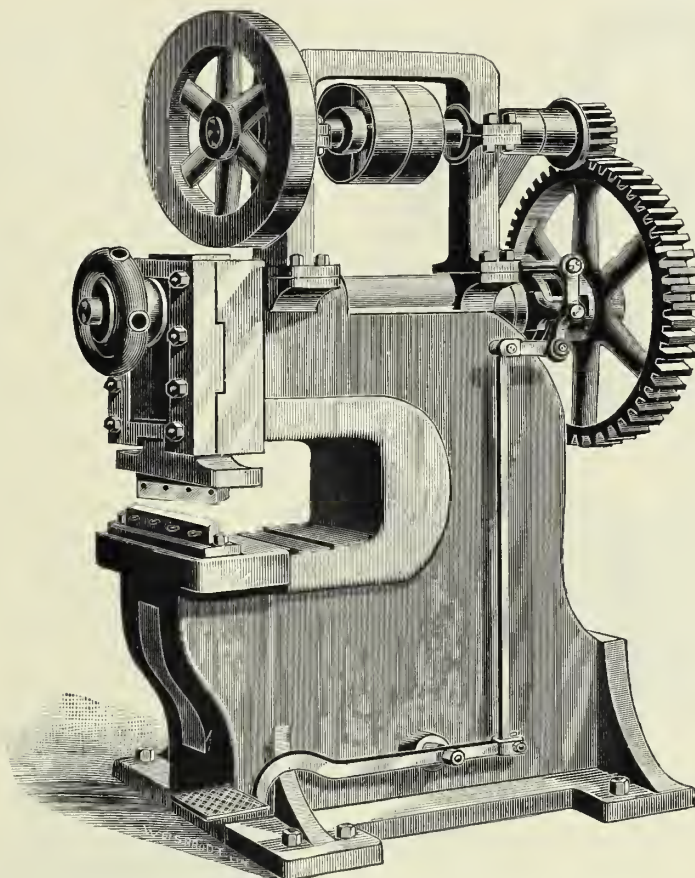
THE above cut represents our No. 2 Boiler Punch or Shear, which we build in different sizes, either single or double. The throats may be even or uneven, with flat or round lower jaw, or with removable jaws. It is adapted to all classes of work, such as punching up close in the corners of flanges and frames, etc. It may be used for shearing. Same built with engine also, if desired. Speed, about 180 revolutions.

Our No. 3 Punch or Shear Machine is the same type as No. 2, only lighter. The same tools are furnished as with No. 2, also.

Depth of Throat.	Will Punch.	Will Cut Flat.	Will Cut Round.	Weight, Single.	Price.	Weight, Double.	Price.
8 inches	$\frac{7}{8} \times \frac{7}{8}$ inch	$\frac{7}{8} \times 5$ inches	$1\frac{1}{2}$ inches	4060 pounds		6700 pounds	
10 inches	$\frac{7}{8} \times \frac{7}{8}$ inch	$\frac{3}{4} \times 5$ inches	$1\frac{3}{8}$ inches	4350 pounds		7000 pounds	
12 inches	$\frac{7}{8} \times \frac{3}{4}$ inch	$\frac{3}{4} \times 5$ inches	$1\frac{1}{4}$ inches	4600 pounds		7360 pounds	
15 inches	$\frac{3}{4} \times \frac{3}{4}$ inch	$\frac{3}{4} \times 5$ inches	$1\frac{1}{4}$ inches	4900 pounds		7820 pounds	
18 inches	$\frac{3}{4} \times \frac{3}{4}$ inch	$\frac{3}{4} \times 5$ inches	$1\frac{1}{4}$ inches	5350 pounds		8600 pounds	
21 inches	$\frac{3}{4} \times \frac{3}{4}$ inch	$\frac{5}{8} \times 5$ inches	$1\frac{1}{4}$ inches	5800 pounds		10000 pounds	
26 inches	$\frac{3}{4} \times \frac{5}{8}$ inch	$\frac{5}{8} \times 5$ inches	$1\frac{1}{8}$ inches	7400 pounds		11500 pounds	

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FIG. 542.



No. 4 SINGLE PUNCH OR SHEAR MACHINE.

THE above illustrates No. 4 Single Punch or Shear Machine, with gearing above, which is sometimes preferred, since it requires less floor space.

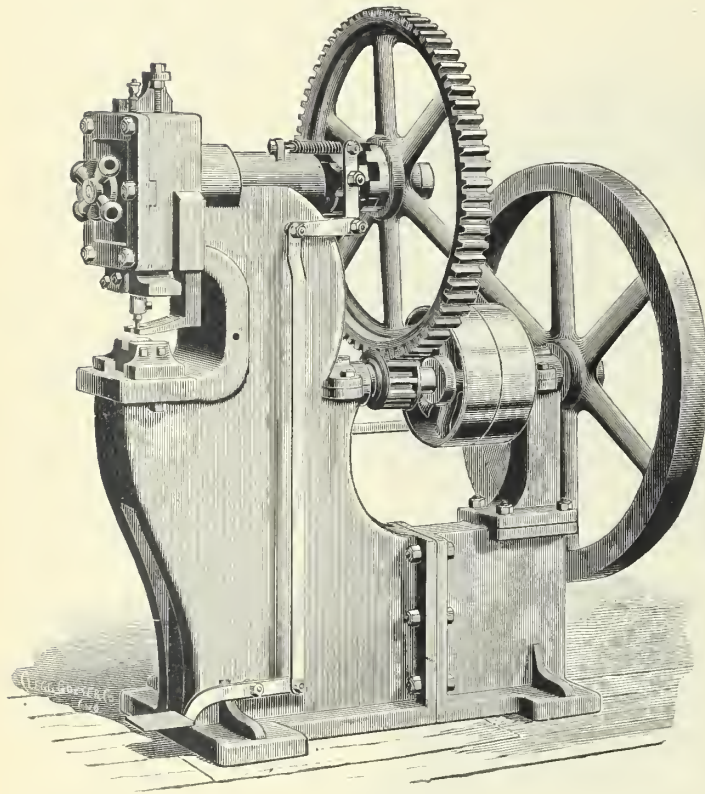
We build same with gearing below, also, same as No. 2 and No. 3 single.

Speed, about 180 revolutions. Price for engine, \$

Depth of Throat.	Will Punch.	Will Cut Flat.	Will Cut Round.	Weight Single.	Price.	Weight Double.	Price.
7 inches	$\frac{3}{4} \times \frac{3}{4}$ inch	$\frac{3}{4} \times 4$ inches	$1\frac{1}{4}$ inches	2950 pounds		5200 pounds	
10 inches	$\frac{3}{4} \times \frac{5}{8}$ inch	$\frac{3}{4} \times 4$ inches	$1\frac{1}{8}$ inches	3300 pounds		5700 pounds	
12 inches	$\frac{3}{4} \times \frac{5}{8}$ inch	$\frac{3}{4} \times 4$ inches	$1\frac{1}{8}$ inches	3600 pounds		6100 pounds	
15 inches	$\frac{3}{4} \times \frac{5}{8}$ inch	$\frac{5}{8} \times 4$ inches	$1\frac{1}{8}$ inches	4000 pounds		6600 pounds	
18 inches	$\frac{3}{4} \times \frac{5}{8}$ inch	$\frac{5}{8} \times 4$ inches	$1\frac{1}{8}$ inches	4300 pounds		7200 pounds	
21 inches	$\frac{5}{8} \times \frac{5}{8}$ inch	$\frac{1}{2} \times 4$ inches	1 inch	4700 pounds		7900 pounds	
24 inches	$\frac{5}{8} \times \frac{5}{8}$ inch	$\frac{1}{2} \times 4$ inches	1 inch	5200 pounds		8500 pounds	

PRENTISS TOOL & SUPPLY CO

FIG. 543.



No. 6 GEARED PUNCH MACHINE.

This illustrates our No. 6 Geared Punch Machine. We also build same double with throat, even or uneven depths. The same tools are furnished with this machine as before mentioned. Speed, 180 revolutions.

Depth of Throat.	Will Punch.	Will Cut Flat.	Will Cut Round.	Weight, Single.	Price.	Weight, Double.	Price.
7 inch	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times 3$	$\frac{7}{8}$	1800		3050	
9 inch	$\frac{1}{2} \times \frac{3}{8}$	$\frac{3}{8} \times 3$	$\frac{3}{4}$	1960		3275	
12 inch	$\frac{1}{2} \times \frac{3}{8}$	$\frac{3}{8} \times 3$	$\frac{3}{4}$	2100		3450	
15 inch	$\frac{3}{8} \times \frac{3}{8}$	$\frac{3}{8} \times 3$	$\frac{3}{4}$	2300		3800	

Our No. 7 Light Power Punch is the same as illustrated, only without gearing.

Depth of Throat.	Will Punch.	Will Cut Flat.	Will Cut Round.	Weight, Single.	Price.	Weight, Double.	Price.
6 inch	$\frac{3}{8} \times \frac{1}{4}$	$\frac{3}{8} \times 2 \frac{1}{2}$	$\frac{3}{4}$	1200		1900	
8 inch	$\frac{3}{8} \times \frac{1}{4}$	$\frac{3}{8} \times 2 \frac{1}{2}$	$\frac{3}{4}$	1275		2150	
10 inch	$\frac{3}{8} \times \frac{1}{4}$	$\frac{3}{8} \times 2 \frac{1}{2}$	$\frac{3}{8}$	1425		2375	

Same Punch without gearing, with clutch, 15 per cent. less.

RANGE AND FURNACE MAKERS' PUNCH SHEAR.

This illustration represents our Geared Power Punch, especially constructed for range makers. This machine has a 26 inch throat in front, and the side punch has a 22 inch throat, being especially adapted for cutting out range fronts. It has two cutters at right angles with each other. The front may be operated by hand or power and the side by hand only. The cutter in front cuts out the opening lengthwise, and the side crosswise. Openings from 2 inches square to any size may be cut, and through metal up to No. 10 gauge without drawing or buckling sheets. The scrap cut out may be used for the doors without even filing or chipping same. Any ordinary punching may also be done on this machine. We furnish with each, one die-block and punch-socket, one punch and shear, one slitting shear, and and one $\frac{3}{4} \times \frac{1}{8}$ and $2 \times \frac{1}{8}$ die and block, punch and socket to cut out the range fronts.

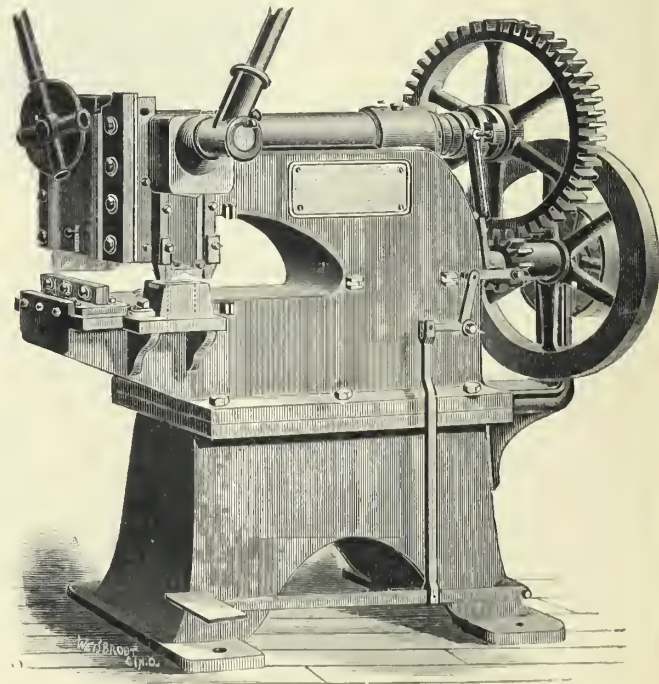
We will furnish at reasonable price a table with gauges to lay the sheets on, which can be set for any size openings required.

Weight, about 2600 pounds.

Price, \$

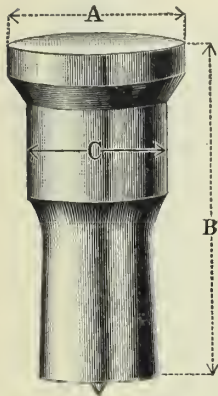
Price, with table, \$

FIG. 544.



PRENTISS TOOL & SUPPLY CO

FIG. 545.



NEW STANDARD PUNCHES.

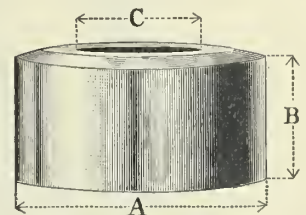
No.	Diameter A.	Length B.	Diameter C.	Diameter of Hole.	Price Each.	Price per Dozen.
1	$\frac{3}{8}$ inch	$\frac{1}{8}$ inch	$\frac{1}{16}$ inch	$\frac{1}{8}$ to $\frac{1}{4}$ inch	\$0.40	\$4.25
2	$\frac{1}{2}$ inch	$\frac{1}{8}$ inches	$\frac{1}{16}$ inch	$\frac{1}{8}$ to $\frac{3}{8}$ inch	.50	5.00
3	$\frac{5}{8}$ inch	$\frac{1}{8}$ inches	$\frac{1}{16}$ inch	$\frac{1}{4}$ to $\frac{5}{8}$ inch	.60	6.00
4	$\frac{3}{4}$ inch	$\frac{1}{8}$ inches	$\frac{1}{16}$ inch	$\frac{1}{4}$ to $\frac{3}{4}$ inch	.85	9.00
4 1/2	$1\frac{1}{16}$ inches	$\frac{1}{8}$ inches	$\frac{1}{16}$ inch	$\frac{3}{8}$ to $\frac{7}{8}$ inch	1.00	10.00
5	$1\frac{5}{16}$ inches	$\frac{1}{8}$ inches	$\frac{1}{16}$ inch	$\frac{5}{8}$ to 1 inch	1.25	13.00
6	$1\frac{3}{8}$ inches	$\frac{1}{8}$ inches	$\frac{1}{16}$ inch	$\frac{3}{4}$ to $1\frac{3}{8}$ inches	1.75	18.00
7	$1\frac{11}{16}$ inches	3 inches	$1\frac{1}{16}$ inches	1 to $1\frac{1}{2}$ inches	2.75	24.00

NEW STANDARD DIES.

No.	Diameter A.	Length B.	Diameter C.	Price Each.	Price per Dozen.
1	1 inch	$\frac{5}{8}$ inch	$\frac{1}{8}$ to $\frac{9}{16}$ inch	\$1.00	\$10.50
2	$1\frac{5}{16}$ inches	$\frac{3}{4}$ inch	$\frac{3}{8}$ to $\frac{3}{4}$ inch	1.25	13.50
3	$1\frac{1}{2}$ inches	1 inch	$\frac{3}{8}$ to $\frac{7}{8}$ inch	1.50	16.00
4	$1\frac{3}{4}$ inches	1 inch	$\frac{1}{2}$ to 1 inch	2.00	22.00
5	$2\frac{1}{4}$ inches	$1\frac{1}{4}$ inches	$\frac{3}{4}$ to $1\frac{1}{4}$ inches	2.50	26.00
6	$2\frac{3}{4}$ inches	$1\frac{1}{4}$ inches	1 to $1\frac{3}{4}$ inches	3.50	36.00

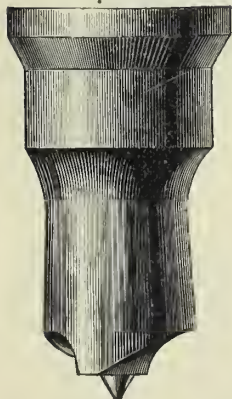
Square or oval punches and dies double the price of round.

FIG. 546.



SHEARING PUNCHES.

FIG. 547.



Where the thickness of the iron is less than one-half the diameter of the hole being punched there is a saving in power in using this type of punch, and the smaller the proportion the greater the saving. This allows a smaller tool to be used with this punch on thin material than would be necessary with a flat punch. Where the proportion is over one-half, the flat punch is better; also less liable to break and at same time easier repaired.

DIMENSIONS AND PRICES.

No.	Diameter A.	Length B.	Diameter C.	Diameter of Hole.	Price Each.	Price per Dozen.
2	$\frac{1}{2}$ inch	$1\frac{5}{16}$ inches	$\frac{1}{16}$ inch	$\frac{1}{8}$ to $\frac{3}{8}$ inch	\$0.50	\$6.00
3	$\frac{5}{8}$ inch	$1\frac{9}{16}$ inches	$\frac{1}{16}$ inch	$\frac{1}{4}$ to $\frac{5}{8}$ inch	.75	9.00
4	$\frac{3}{4}$ inch	$1\frac{5}{8}$ inches	$\frac{1}{16}$ inch	$\frac{1}{4}$ to $\frac{3}{4}$ inch	1.08	13.00
5	$1\frac{5}{16}$ inches	$2\frac{1}{8}$ inches	$1\frac{1}{16}$ inches	$\frac{3}{8}$ to 1 inch	1.50	18.00
6	$1\frac{3}{8}$ inches	$2\frac{5}{8}$ inches	$1\frac{7}{16}$ inches	$\frac{3}{4}$ to $1\frac{3}{8}$ inches	2.00	24.00
7	$1\frac{11}{16}$ inches	3 inches	$1\frac{1}{16}$ inches	1 to $1\frac{1}{2}$ inches	3.00	36.00
8	To suit	To suit	To suit			
9						
10						
11						
12						

A—Diameter of head.

B—Length over all.

C—Diameter of body.

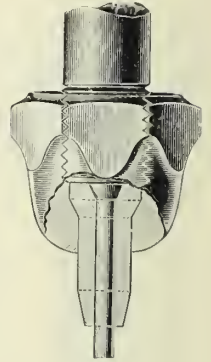
PRENTISS TOOL & SUPPLY CO.

PUNCH BUSHINGS.

For users of small punches, who ruin a great many by breakage or excessive wear, we have what is termed a "punch bushing," which, when used in connection with our stock and coupling, simplifies the making of the punches, and greatly reduces the cost. New punches are made by cutting the required length from a rod of "Stubs" wire or Park Brothers' rod, and upsetting the end in the form of a head with a hammer. There is no set screw "in the way" or to "strip the thread," and the punch is held central and firm.

Price, No. 1 coupling,	-	-	-	-	-	-	-	-	\$0.90
Price, No. 2 coupling,	-	-	-	-	-	-	-	-	1.00
Price, No. 3 coupling,	-	-	-	-	-	-	-	-	1.25
Price, No. 4 coupling,	-	-	-	-	-	-	-	-	1.50

FIG. 548.



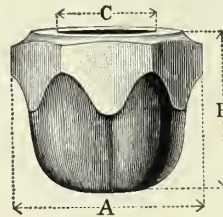
NEW STANDARD PUNCH STOCKS AND COUPLINGS.

FIG. 549.



STOCK.

FIG. 550.



COUPLINGS.

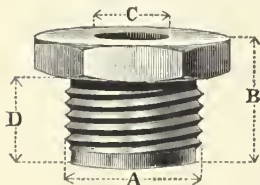
No.	Diameter A.	Length B.	Diameter C.	No. of Machine.	Price.	Diameter A.	Length B.	Diameter C.	Diameter E.	No. of Machine.	Price.
0	1/2 inch	2 1/4 inches	1/2 inch	1, hand	\$0.85	.....	.....	.....	.....	.....	.....
1	5/8 inch	1 5/8 inches	1/2 inch	2, combined	.95	3/4 inch	1 3/8 inch	1/2 inch	9/8 inch	{ 1, hand	\$0.90
2	5/8 inch	1 11/16 inches	1 1/16 inch	2, hand	1.00	1 inch	1 1/16 inches	1 1/16 inch	7/8 inch	{ 2, hand	1.00
3	5/8 inch	1 7/8 inches	1 5/8 inch	{ 3, hand	1.25	1 3/8 inches	1 5/8 inch	1 5/8 inch	5/8 inch	{ 3, comb'd	1.25
				{ 4, hand						{ 3 1/2, hand	
				{ 3, combined						{ 4, hand	
4	3/4 inch	1 1/2 inches	1 5/8 inch	3 1/2, hand	1.50	1 7/8 inches	1 1/4 inches	1 5/8 inches	1 3/8 inch	5, hand	1.50
5	7/8 inch	2 1/8 inches	1 5/8 inches	{ 5, hand	1.75	1 7/8 inches	1 1/4 inches	1 5/8 inches	1 5/8 inch	6, hand	1.75
				{ 6, hand							

Reducing stocks of extra length to fit lower number of couplings, 10 per cent. extra.

NEW STANDARD PUNCH GLANDS.

In our hydraulic and screw punches, where the jaw is very low, there is not room enough for stocks and couplings, and for this class of tools we use the gland shown instead of the coupling.

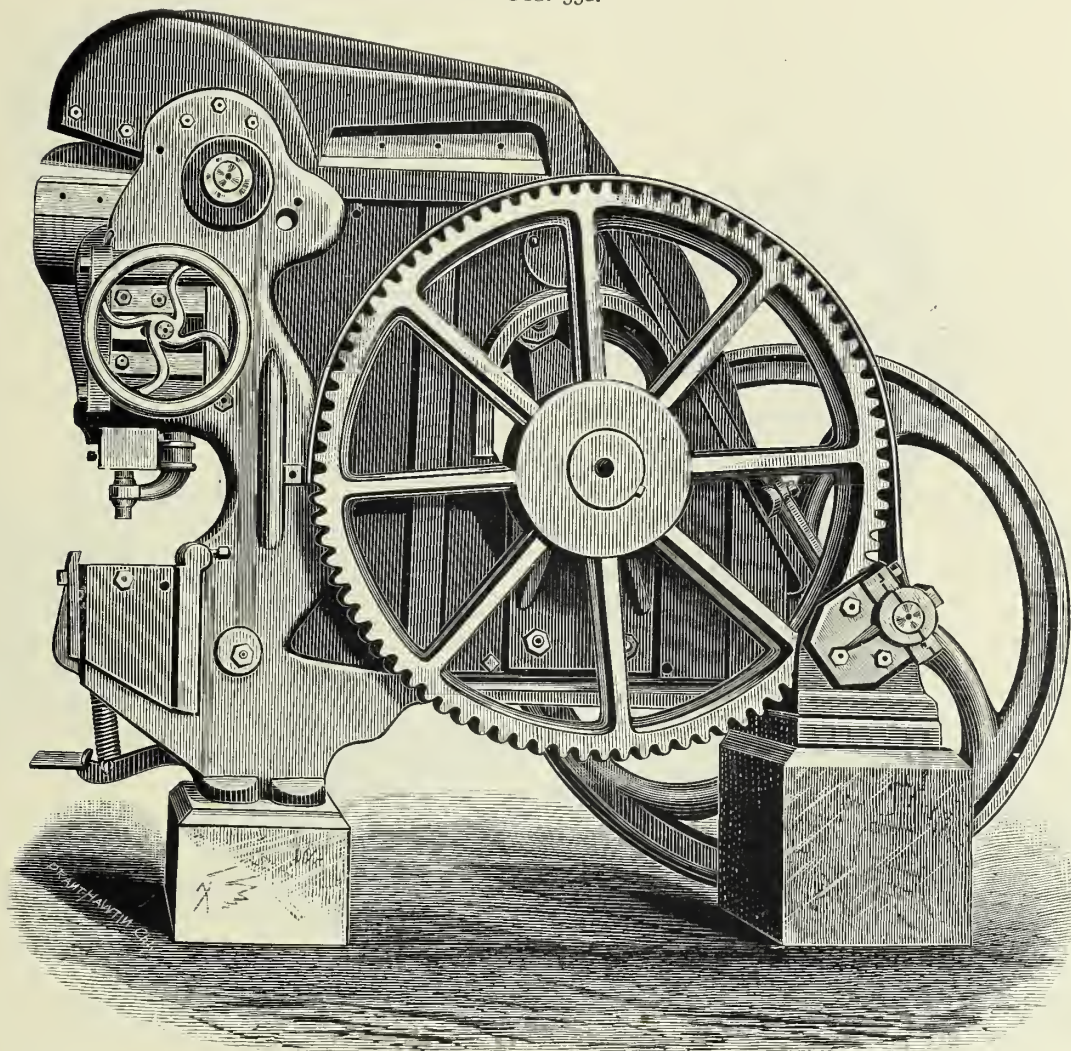
FIG. 551.



No.	Diameter A.	Length B.	Diameter C.	Length D.	Price.
1	.....	.....	.....	.....	\$1.00
2	1 inch	3/4 inch	7/8 inch	1/2 inch	1.15
3	1 1/8 inches	1 3/8 inch	5/8 inch	9/16 inch	1.40
4	1 1/4 inches	1 1/2 inch	1 1/8 inch	1 1/8 inch	1.65
5	1 5/8 inches	1 7/8 inch	1 1/4 inches	5/8 inch	2.15
6	1 3/4 inches	1 1/2 inches	1 1/4 inches	1 1/8 inch	2.50
7	2 1/8 inches	1 1/2 inches	1 1/8 inches	1 1/8 inch	3.00

PRENTISS TOOL & SUPPLY CO.

FIG. 552.



COMBINED PUNCHES AND SHEARS.

DESCRIPTION OF NO. 1 B, NO. 1 E, AND NO. 1 F.

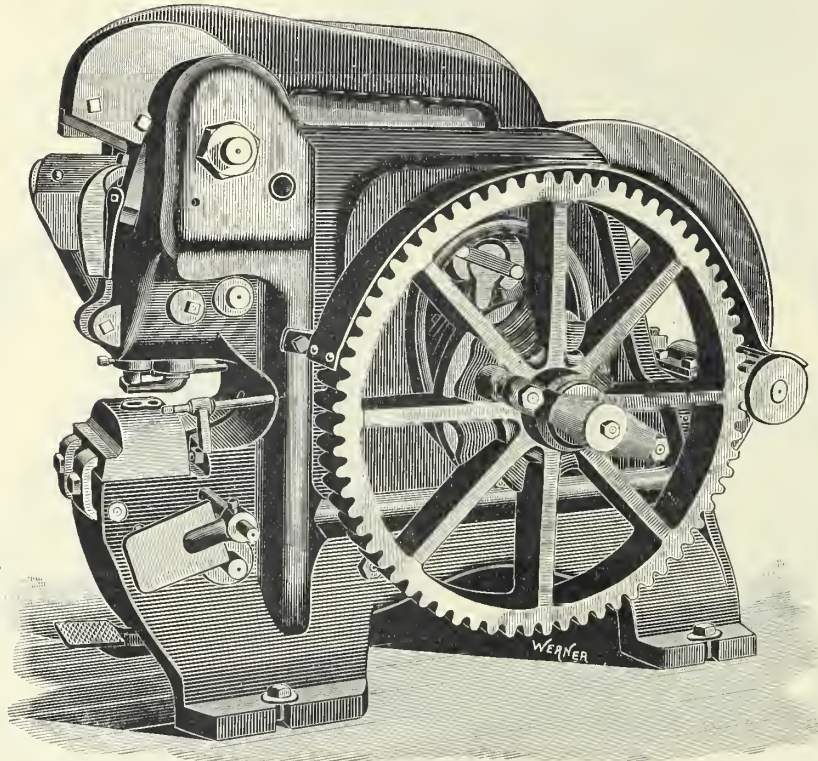
No. 1 B punches a $1\frac{1}{4}$ inch hole in $\frac{3}{4}$ inch iron, cuts $\frac{3}{4} \times 5$ inches flat bar iron or $1\frac{1}{2}$ inches round iron, or their equivalents. Has tight and loose pulleys 20×6 inches, which should make 250 revolutions per minute.

No. 1 E punches $1\frac{1}{4}$ inch hole in $\frac{3}{4}$ inch iron, cuts $\frac{3}{4} \times 6$ inches or $\frac{1}{4} \times 14$ inches flat bar iron and $1\frac{1}{2}$ inches round iron or their equivalents. Has tight and loose pulleys 20×6 inches, which should make 250 revolutions per minute.

No. 1 F punches $1\frac{1}{2}$ inch hole in 1 inch iron and cuts 8×1 inches flat bar iron or 2 inches round iron, or their equivalents. Has tight and loose pulleys 24×6 inches, which should make 275 revolutions per minute.

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FIG. 553.



COMBINED PUNCHES AND SHEARS.

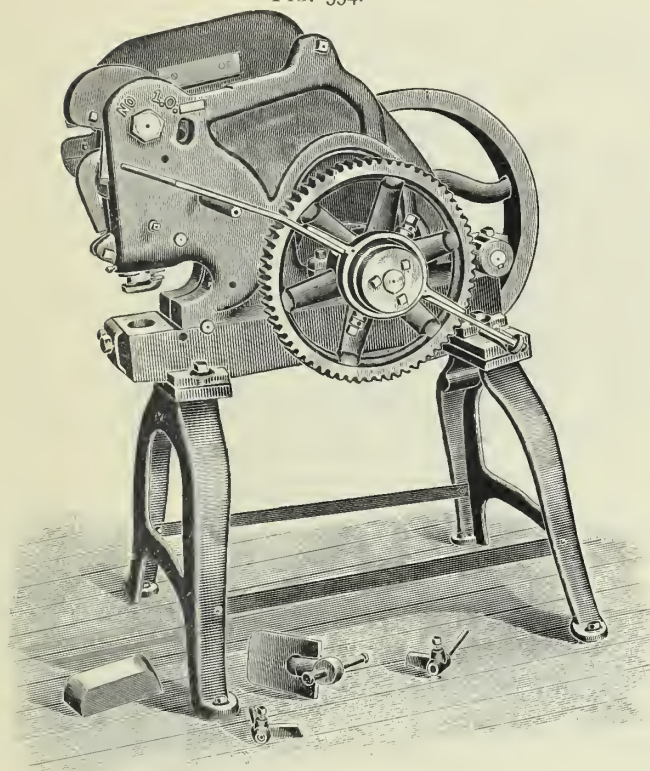
NO. 1 C AND NO. 1 D.

No. 1 C punches 1 inch hole in $\frac{5}{8}$ inch iron, cuts $\frac{5}{8} \times 4$ inches flat bar iron or $1\frac{1}{4}$ inches round iron, or their equivalents. Has tight and loose pulleys 18 x 5 inches, which should make 225 revolutions per minute.

No. 1 D punches 1 inch hole in $\frac{3}{4}$ inch iron, cuts $\frac{3}{4} \times 4$ inches or $\frac{1}{4} \times 14$ inches flat bar iron or $1\frac{1}{4}$ inches round iron, or their equivalents. Has tight and loose pulleys 18 x 5 inches, which should make 225 revolutions per minute.

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FIG. 554.



COMBINED PUNCHES AND SHEARS.

No. 1 A, No. 1 A $\frac{1}{2}$ AND No. 1 A $\frac{3}{4}$.

No. 1 A punches a $\frac{5}{8}$ inch hole in $\frac{7}{16}$ inch iron, cuts $2\frac{1}{2} \times \frac{1}{2}$ inch flat iron or $\frac{7}{8}$ inch round iron, or their equivalents. The belt runs on balance wheel, which is 26×4 inches, and should make 225 revolutions per minute.

No. 1 A $\frac{1}{2}$ punches $\frac{3}{4}$ inch hole in $\frac{1}{2}$ inch iron, cuts $3\frac{1}{2} \times \frac{1}{2}$ inch flat iron or 1 inch round iron, or their equivalents. It has tight and loose pulleys 15×4 inches, which should make 225 revolutions per minute.

No. 1 A $\frac{3}{4}$ punches $\frac{3}{4}$ inch hole in $\frac{9}{16}$ inch iron, cuts $\frac{1}{2} \times 4$ inches flat iron or $1\frac{1}{8}$ inches round iron, or their equivalents. It has tight and loose pulleys 15×4 inches, which should make 225 revolutions per minute.

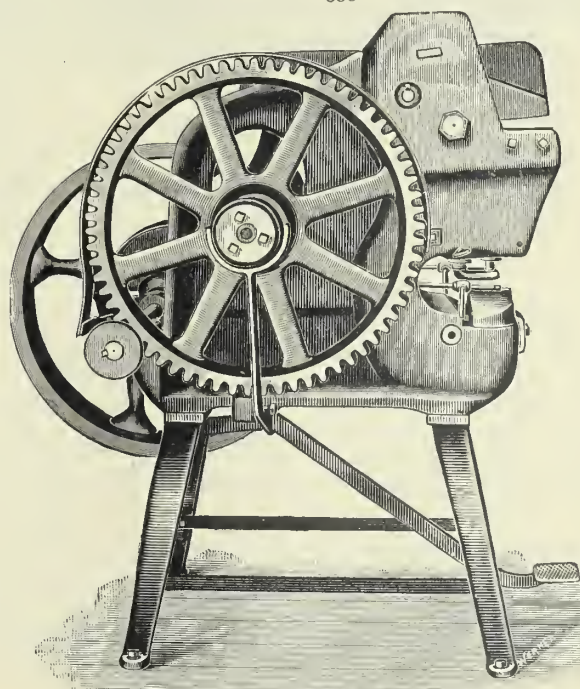
COMBINED PUNCHES AND SHEARS.

No. 1 O AND No. 1 O $\frac{1}{2}$.

No. 1 O punches a $\frac{1}{2}$ inch hole in $\frac{5}{16}$ inch iron, cuts $4 \times \frac{8}{16}$ inch or $1\frac{5}{8} \times \frac{1}{2}$ inch or $\frac{3}{4}$ inch round, or their equivalents. Belt runs on balance wheel, which is $24 \times 3\frac{1}{2}$ inches, and should make 200 revolutions per minute.

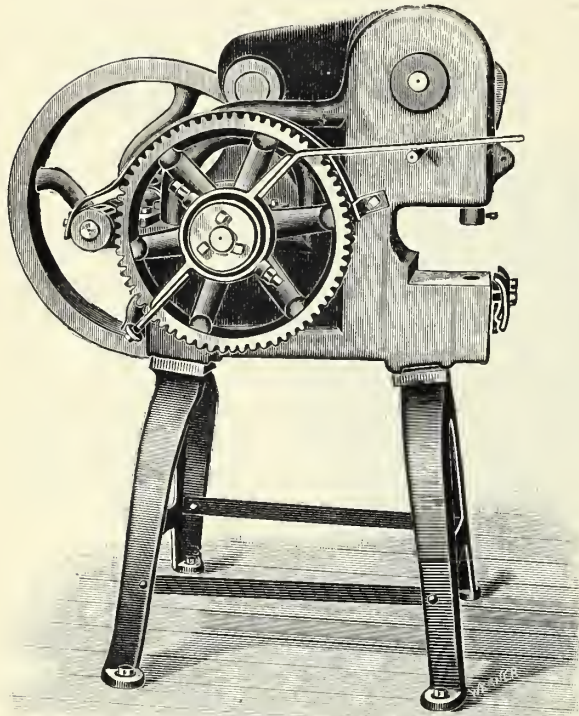
No. 1 O $\frac{1}{2}$ punches $\frac{1}{2}$ inch hole in $\frac{3}{8}$ inch iron, cuts $\frac{1}{4} \times 5$ inches or $\frac{1}{2} \times 2$ inches or $\frac{3}{4}$ inch round, or their equivalents. Has tight and loose pulleys, 12×3 inches. Pulleys should make 200 revolutions per minute.

FIG. 555.



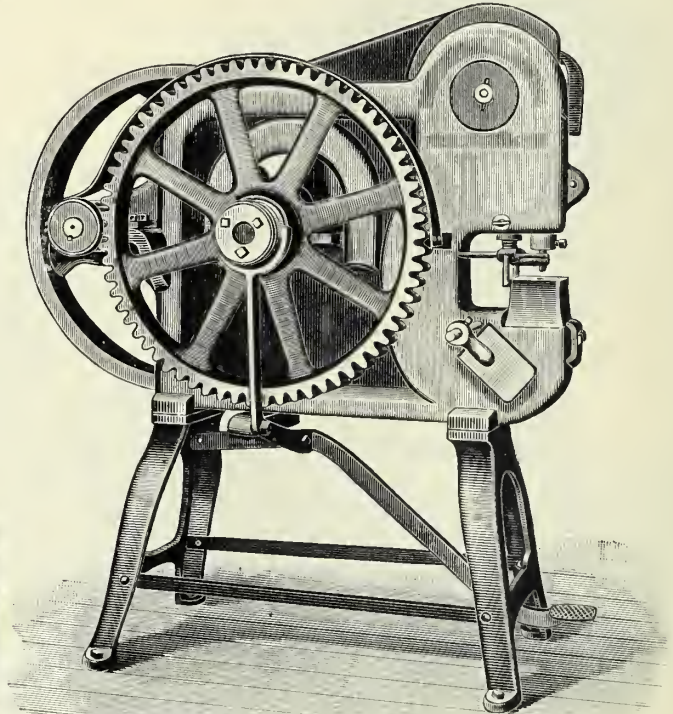
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FIG. 556,



No. 16 A AND No. 16 B.

FIG. 557.



No. 16 C, No. 16 D, No. 16 E, No. 16 F.

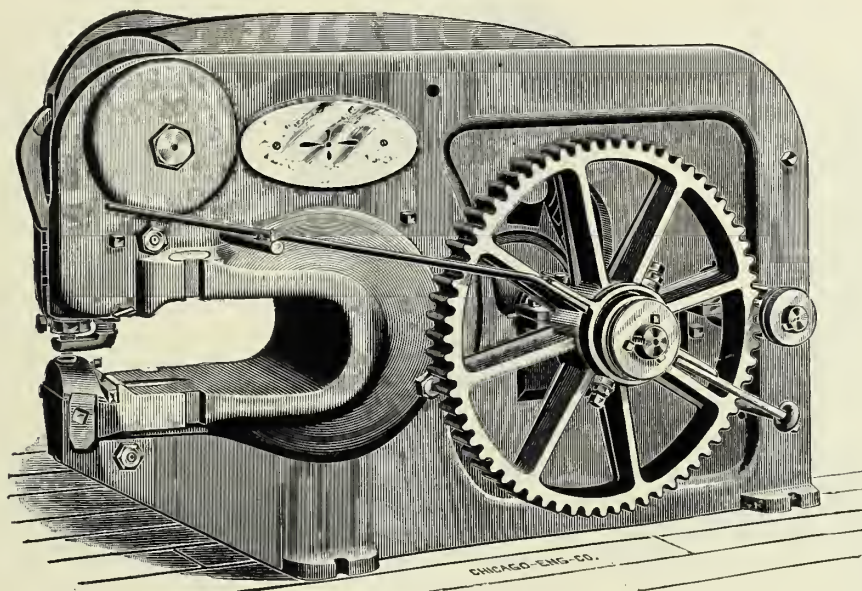
METAL PUNCHING MACHINES.

DESCRIPTIONS OF MACHINES IN NO. 16 SERIES—TEN SIZES.

Size.	Back Geared.	Opening in Bed.	Depth of Jaw.	Diameter and Thickness will Punch.	Size of Tight and Loose Pulleys.	Stroke of Slide.	Number of Revolutions of Pulleys.	Weight, Pounds.	Price.
A	66 to 10	2 x 2 inches	4 inches	$\frac{1}{2} \times \frac{1}{4}$ inch	10 x 3 inches	$\frac{1}{2}$ inch	200	600	
B	67 to 10	3 x 2 inches	5 inches	$\frac{1}{2} \times \frac{3}{8}$ inch	12 x 3 inches	$\frac{5}{8}$ inch	200	950	
C	66 to 9	2 x 4 inches	6 inches	$\frac{3}{4} \times \frac{1}{2}$ inch	15 x 4 inches	$\frac{7}{8}$ inch	225	2000	
D	69 to 9	6 x 3 inches	6 inches	1 x $\frac{3}{4}$ inch	18 x 5 inches	1 inch	225	3400	
E	86 to 10	12 x 3 inches	7 inches	$1\frac{1}{4} \times \frac{7}{8}$ inch	20 x 6 inches	$1\frac{1}{2}$ inch	250	5500	
F	89 to 8	12 x 4 inches	8 inches	$1\frac{1}{2} \times 1$ inch	20 x 6 inches	2 inch	225	8000	
G	128 to 9	12 x 6 inches	8 inches	2 x $1\frac{1}{2}$ inch	30 x 8 inches	$2\frac{1}{2}$ inch	350	10000	

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FIG. 558.



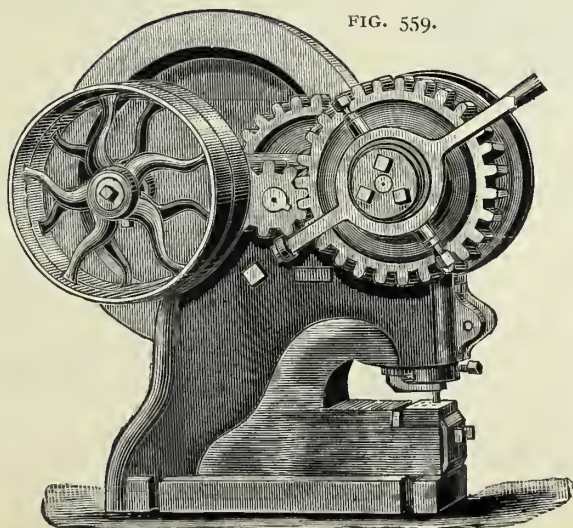
No. 12 SERIES BELT POWER PUNCHES.

FOR BOILER MAKERS AND SHEET METAL WORKERS.

TABLE OF WEIGHTS, CAPACITIES, ETC.

Size.	Capacity.	Punches to the Center of	Weight	Size of Pulleys.
OO	$\frac{1}{4} \times \frac{1}{4}$ inch	4 inches	150 pounds	8 x 2 inches
O	$\frac{1}{8} \times \frac{1}{4}$ inch	7 inches	270 pounds	8 x 2 inches
A	$\frac{3}{8} \times \frac{3}{8}$ inch	10 inches	1400 pounds	10 x 3 inches
A $\frac{1}{4}$	$\frac{5}{8} \times \frac{3}{8}$ inch	15 inches	1650 pounds	10 x 3 inches
A $\frac{1}{2}$	$\frac{5}{8} \times \frac{3}{8}$ inch	30 inches	2000 pounds	10 x 3 inches
B	$\frac{3}{4} \times \frac{1}{2}$ inch	30 inches	2660 pounds	15 x 4 inches
C	$\frac{3}{4} \times \frac{1}{2}$ inch	36 inches	4000 pounds	18 x 5 inches
D	$\frac{3}{4} \times \frac{5}{8}$ inch	48 inches	5300 pounds	18 x 5 inches
E	1 x $\frac{5}{8}$ inch	60 inches	7000 pounds	24 x 6 inches
F	1 x $\frac{3}{4}$ inch	74 inches	9000 pounds	24 x 6 inches

FIG. 559.

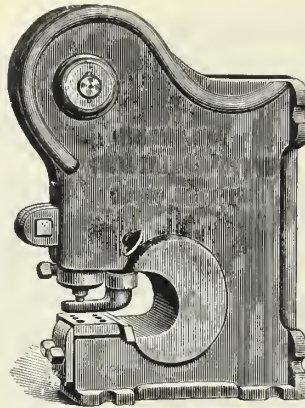


No. 12 O AND No. 12 OO.

We give a list of ten sizes of these machines varying in capacity and depth of jaw. We make many other sizes of these machines adapted to all kinds of boiler work. They are all similar in general construction to cut shown. They are strong, powerful and well made. The distance from center of punch to front of machine is but $\frac{3}{4}$ inch, so they can be used for punching flanges. The boxes for eccentric shaft and balance wheel shaft are all cast solidly on machine and every part is strong and stiff. They are shipped complete, ready for use.

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FIG. 560.



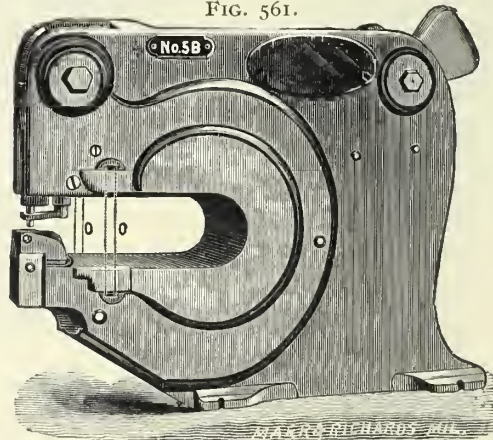
HAND POWER PUNCH.

The No. 500 will punch a $\frac{1}{4}$ inch hole in $\frac{1}{4}$ inch iron to the center of 4 inches. Weight, 50 pounds. Price, \$

The No. 50 will punch a $\frac{5}{16}$ inch hole in $\frac{1}{4}$ inch iron to the center of 7 inches. Weight, 110 pounds. Price, \$

In above machine the distance from center of punch to front of machine is $\frac{3}{4}$ inch or less, so they can be used for punching flanges. The lever works either to front or rear, and machine can be bolted to a bench or post. We send with each machine three round punches, and one die plate with six dies in same.

FIG. 561.



HAND POWER PUNCH.

FOR BOILER MAKERS AND SHEET METAL WORKERS.

TABLE OF WEIGHTS, CAPACITIES, ETC., NO. 5 SERIES.

Size.										Capacity.	Punches to the Center of	Weight.	Price.
A	-	-	-	-	-	-	-	-	-	$\frac{5}{8} \times \frac{3}{8}$ inch	10 inches	365 pounds	
A $\frac{1}{4}$	-	-	-	-	-	-	-	-	-	$\frac{5}{8} \times \frac{3}{8}$ inch	15 inches	500 pounds	
A $\frac{1}{2}$	-	-	-	-	-	-	-	-	-	$\frac{5}{8} \times \frac{3}{8}$ inch	30 inches	1100 pounds	
B	-	-	-	-	-	-	-	-	-	$\frac{3}{4} \times \frac{1}{2}$ inch	30 inches	1400 pounds	
C	-	-	-	-	-	-	-	-	-	$\frac{3}{4} \times \frac{1}{2}$ inch	36 inches	2350 pounds	
D	-	-	-	-	-	-	-	-	-	$\frac{3}{4} \times \frac{5}{8}$ inch	48 inches	3000 pounds	
E	-	-	-	-	-	-	-	-	-	1 x $\frac{5}{8}$ inch	60 inches	5000 pounds	
F	-	-	-	-	-	-	-	-	-	1 x $\frac{3}{4}$ inch	74 inches	7000 pounds	

Distance from center of punch to front of machine is but $\frac{3}{4}$ inch, so machine can be used for punching flanges.

We send with each machine one round punch and die of any desired size; also all necessary levers. Machine is shipped complete, ready for use.

PRENTISS TOOL & SUPPLY CO.

POWER PUNCHES.

FIG. 562.

THE No. 71 is made without legs, to be used on a bench. We make this machine to order, with the cam shaft extended through so as to attach the regular hand lever, making it capable of use by either hand or power, at an extra cost of 10 per cent. These machines are rated at what they are capable of doing by hand. For use with a belt, we do not recommend them to perform over one-half the rated duty.

All sizes, except No. 71, have the automatic start and stop motion.

SPECIFICATIONS.

No. of punch, - - - -	71	72	73	74	75	76	77	78
Weight, about - - - pounds	100	200	390	620	760	1100	1350	1700
Capacity in { diam. of hole, inch	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$
plate iron } thickness, - inch	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$
Greatest distance will punch } from edge, - - - - inch	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{3}{4}$	6	$7\frac{1}{4}$	$8\frac{1}{2}$	$9\frac{3}{4}$	$11\frac{1}{4}$
Movement of slide bar, - - inch	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$
Diameter of socket in slide bar, - - - - inch	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
Diameter of socket in die holder, - - - - inch	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	2	2	2
Diameter of hole in bed, - - - - inch	$1\frac{1}{2}$	$1\frac{1}{2}$	2	3	4	4	5	5
Diameter of balance wheel, - - - - inch	10	12	16	20	24	28	30	30
Width of balance wheel, - - - -	2	2	3	$3\frac{1}{2}$	4	4	5	5
Revolutions per minute, - - - -	100	80	75	70	60	50	40	30

No dies or punches are furnished with machines.

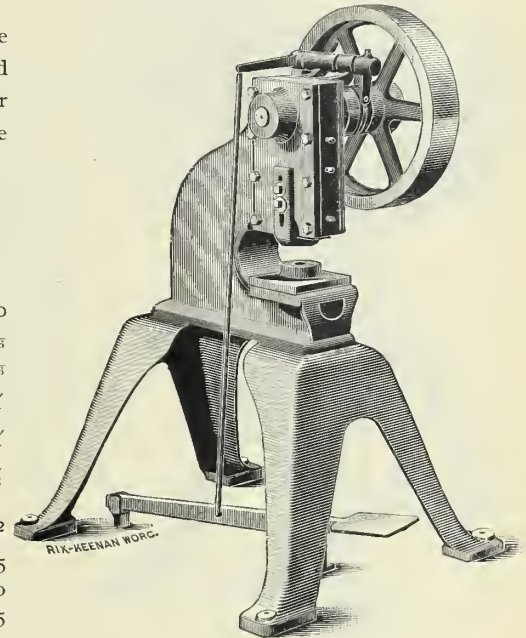


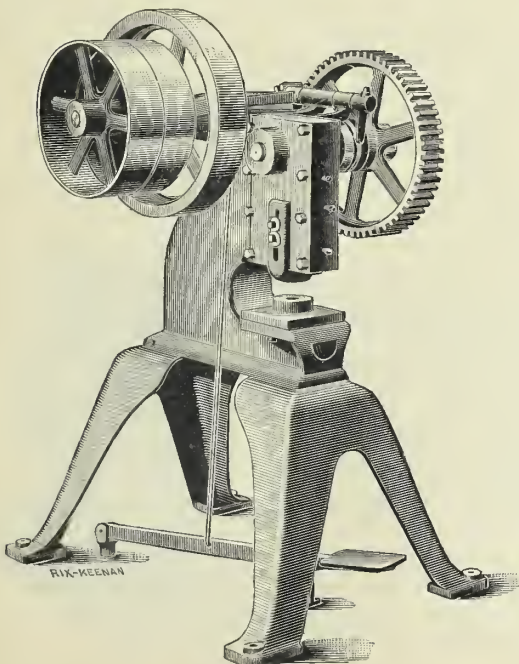
FIG. 563.

GEARED POWER PUNCHES.

ALL SIZES, EXCEPT NO. 81, HAVE THE AUTOMATIC START AND STOP MOTION.

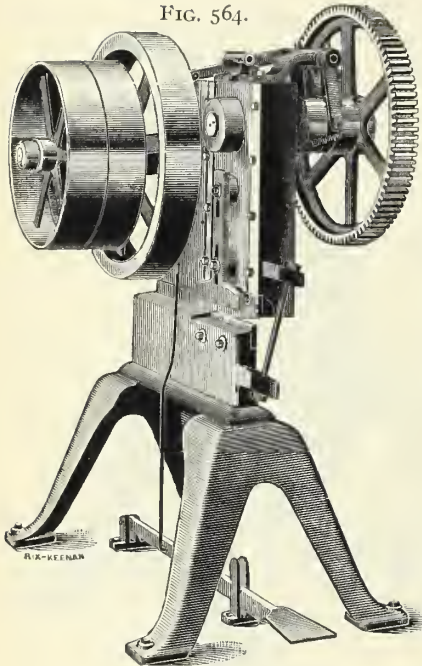
SPECIFICATIONS.

No. of punch, - - - -	81	82	83	84	85	86	87	88
Weight, about - - - pounds	125	275	475	700	1000	1400	1600	1900
Capacity in { Diam. of hole, inch	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$
plate iron } Thickness metal, inch	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$
Greatest distance will punch } from edge of sheet, - - - - inch	$2\frac{1}{2}$	$3\frac{1}{4}$	$4\frac{3}{4}$	6	$7\frac{1}{4}$	$8\frac{1}{2}$	$9\frac{3}{4}$	$11\frac{1}{4}$
Movement of slide bar, - - - - inch	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$
Diameter of socket in slide bar, inch	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
Diameter of socket in die holder, inch	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{3}{4}$	2	2	2
Diameter of hole in bed, - - - - inch	$1\frac{1}{2}$	$1\frac{1}{2}$	2	3	4	4	5	5
Diameter of fly wheel, - - - - inch	10	12	16	20	24	28	30	30
Width of fly wheel, - - - - inch	2	3	3	$3\frac{1}{2}$	4	4	5	5
Diameter of T. and L. pulleys, inch		10	12	16	18	20	22	24
Width of T. and L. pulleys, inch		$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	$3\frac{1}{2}$	4	4
Revolutions per minute, about, inch		320	375	350	300	250	200	180
Ratio of gearing, - - - - inch	4:1	4:1	5:1	5:1	5:1	5:1	5:1	6:1



PRENTISS TOOL & SUPPLY CO.

FIG. 564.



COMBINED GEARED PUNCH AND SHEAR.

(Dimensions Fig. No. 564.)

No. of machine,	43	44	45	46	47	48
Weight, about - - - - - pounds	550	1150	1450	1900	2200	2500
Capacity in } Diameter of whole will punch, inch	$\frac{1}{4}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{9}{8}$
plate iron. } Thickness of metal will punch or shear, inch	$\frac{1}{4}$	$\frac{1}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$
Greatest distance will punch from edge of sheet, inch	2	$3\frac{3}{4}$	3	3	$3\frac{1}{2}$	$3\frac{1}{2}$
Movement of slide bar, - - - - - inch	$\frac{7}{8}$	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$
Diameter of socket in slide bar, - - - - - inch	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
Diameter of socket in die holder, - - - - - inch	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{3}{4}$	2	2	2
Diameter of hole in die bed, - - - - - inch	$1\frac{3}{4}$	2	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$
Length of shear blades, - - - - - inch	$5\frac{1}{2}$	$7\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$9\frac{1}{2}$	10
Diameter of fly wheel, - - - - - inch	17	21	25	28	30	30
Width of fly wheel, - - - - - inch	3	$3\frac{1}{2}$	4	4	5	5
Diameter of tight and loose pulleys, - - - - - inch	12	16	18	20	22	24
Width of tight and loose pulleys, - - - - - inch	3	3	$3\frac{1}{2}$	$3\frac{1}{2}$	4	4
Revolutions per minute, about - - - - -	375	350	300	250	200	180
Ratio of gearing, - - - - -	5:1	5:1	5:1	5:1	5:1	6:1

IMPROVED No. 3 LEVER PUNCH.

REAR WORKING LEVER.

(Description, etc., Fig. No. 565.)

These Punches were designed for use on bar iron, and the edge of sheet iron with the lever working to the rear, so that the operator can stand in the rear of the punch to operate the tool. All parts are carefully fitted.

The levers, gears, blocks and pins are all made of steel.

Weight, 164 pounds.

FIG. 565.

Size of Hole.	Thickness of iron.	Depth of Jaw.	Number of Stock.	Number of Coupling.	Number of Punch.	Number of Die.	Price.
$\frac{3}{8}$ inch	$\frac{1}{4}$ inch	$3\frac{1}{2}$ inches	3	3	3	2	\$60.00

Square or oval punches and dies double the price of round.

FIG. 566.

HAND POWER SCROLL PUNCH.

(Description Fig. No. 566.)

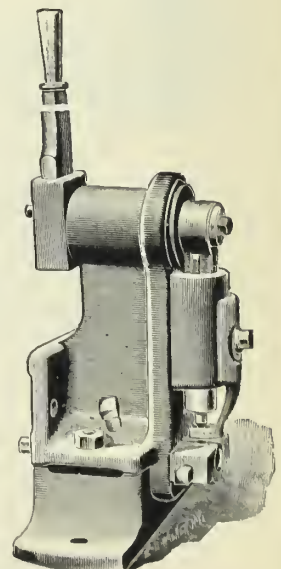
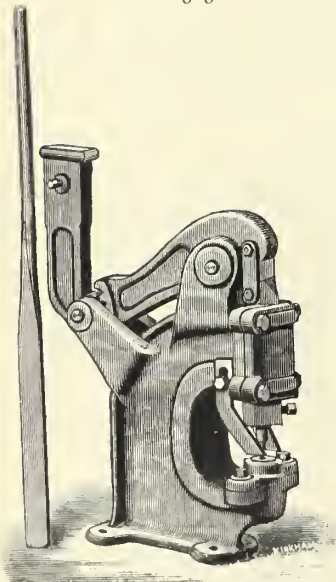
This tool is intended especially for the use of those who have to punch holes through small scroll bends, and in order to obtain the greatest stiffness with small size, the dies are located in the ends of a tool-steel bar passing through the body of the machine, the bar being 1 inch in diameter at one end and flattened to a larger circle at the other, and the centers of dies $\frac{3}{8}$ inch from end of bar. A small table for punching flat iron is shown in position attached to die bar.

The punch as shown is to be bolted down to the bench, but it can be detached and bolted to a post if desired. There is also a special projection for holding it in a vise. The lever is easily removed, as it slips into a socket as shown.

Capacity of tool $\frac{1}{4}$ inch hole in $\frac{1}{4}$ inch iron.

The tool and stand weighs 60 pounds.

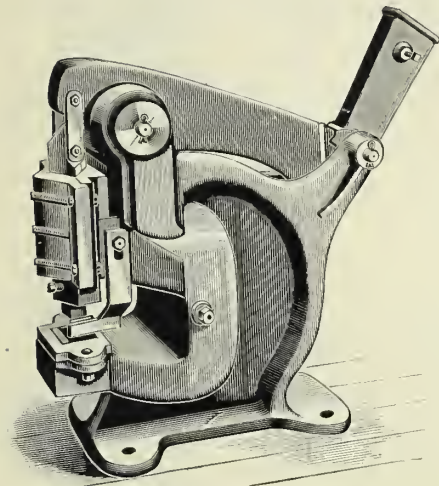
Price, with two punches and two dies, \$30.00.



PRENTISS TOOL & SUPPLY CO

FIG. 567

IMPROVED No. 6 HAND PUNCH.



THIS cut shows a heavy punch made for the use of iron railing manufacturers, bridge and building contractors and truck manufacturers.

The gears and arms are made of crucible steel; the pins of the best tool steel. The plunger is square, the bearing very long, carefully fitted and scraped, thus insuring long wearing qualities and the punch entering any shaped die properly. The strain between arm and plunger is taken upon a solid block, well fitted, easily gotten at and lubricated, and so designed that it has only $\frac{1}{16}$ inch of revolution. The opening behind the punch is $7\frac{5}{8}$ inches deep by 6 inches high. The hole in lower jaw is $1 \times 1\frac{1}{2}$, which is large enough for iron railing tenoning. Upon special order the hole in lower jaw is made $1\frac{1}{2} \times 3\frac{3}{4}$ inches for punching

truck wrung irons $1\frac{1}{8} \times 2\frac{1}{2}$ inches. A hole of $\frac{3}{4}$ of an inch in diameter can be punched in $\frac{1}{2}$ inch iron. The punch weighs about 1025 pounds.

Price of punch with one size round punch and die,	-	-	-	-	-	-	\$175.00
Shear attachment for iron $\frac{3}{8} \times 3$ inches,	-	-	-	-	-	-	10.00
Tenoning attachment,	-	-	-	-	-	-	12.00
Angle iron shear for $2\frac{1}{2}$ inches angle or smaller,	-	-	-	-	-	-	16.00
$1\frac{1}{8} \times 3\frac{1}{2}$ inches punch and die, per pair,	-	-	-	-	-	-	20.00

PATENT COMBINED HAND PUNCH AND SHEAR.

THESE machines will be found very useful tools for general use, as they are a combination of the round and flat iron shears and hand punch, and the workmanship put upon them is of the best, no casting fits, but all parts are carefully fitted by hand or machine.

No. 2 will cut $\frac{1}{2}$, $\frac{3}{8}$ and $\frac{1}{4}$ inch round iron, and $2 \times \frac{1}{4}$ inch bar iron; will punch $\frac{1}{4}$ inch holes in $\frac{1}{4}$ inch iron, $3\frac{3}{4}$ inches from edge to centre of hole. Weight, 200 pounds. Price, \$50.00.

Fitted with new standard stock No. 1, coupling No. 1, punch No. 2, die No. 2.

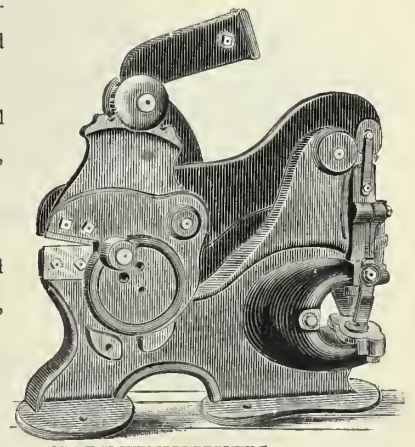
No. 3 will cut $\frac{3}{4}$, $\frac{5}{8}$ and $\frac{1}{2}$ inch round iron, and $3\frac{1}{2} \times \frac{3}{8}$ inch bar iron; will punch $\frac{3}{8}$ inch hole in $\frac{3}{8}$ inch iron, 4 inches from edge to centre of hole. Weight, 400 pounds. Price, \$100.00.

Fitted with new standard stock No. 3, coupling No. 3, punch No. 2, die No. 2.

Punch and die for tenoning in $\frac{1}{4}$ inch iron. Price, \$10.00.

One punch and die only with each machine.

FIG. 568.



Description, etc., Fig. No. 569.

One size punch and die with each machine, $\frac{1}{8}$, $\frac{3}{16}$, or $\frac{1}{4}$ inch. Extra sets, per set, 75c. Capacity, $\frac{1}{4}$ inch through $\frac{1}{8}$ inch iron, to center of 4 inch work.

Price, \$15.00.

FIG. 570.

No.	Depth of Jaw.	Diameter of Hole.	Thickness of Iron.	No. of Stock.	No. of Coupl'g.	No. of Punch.	No. of Die.	Weight Lbs.	Prices.
0	2 $\frac{1}{2}$ inches	$\frac{1}{8}$ inch	$\frac{1}{8}$ inch			11	1	33	\$20.00
1	3 $\frac{1}{2}$ inches	$\frac{3}{16}$ inch	$\frac{3}{16}$ inch	0	1	1	2	65	26.00
2	3 $\frac{3}{4}$ inches	$\frac{1}{4}$ inch	$\frac{1}{4}$ inch	2	2	2	2	115	40.00
3	4 inches	$\frac{5}{16}$ inch	$\frac{5}{16}$ inch	3	3	3	2	175	52.00
3 $\frac{1}{2}$	4 inches	$\frac{3}{8}$ inch	$\frac{5}{16}$ inch	4	3	3	2	200	65.00
4	4 inches	$\frac{3}{8}$ inch	$\frac{3}{8}$ inch	3	3	3	2	325	88.00
5	7 $\frac{1}{2}$ inches	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch	5	4	4	4	500	115.00

FIG. 572.

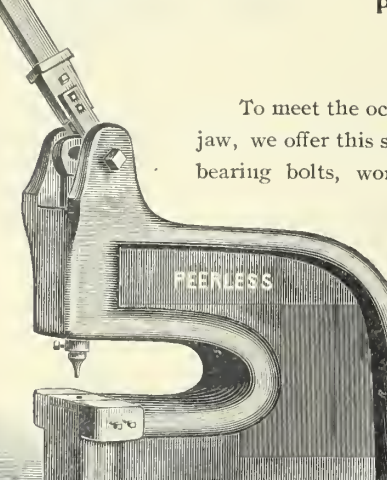
(Description Fig. No. 571.)

FIG. 571.

PEERLESS

(De

To meet the occasion
jaw, we offer this style.
bearing bolts, works in



(Dimensions, etc., Fig. No. 572.)

No. of punch,	-	-	-	-	-	61	62	63	64	65	66	67	68
Weight about,	-	-	-	-	pounds	60	200	325	500	700	1000	1200	1500
Capacity in plate iron,	-	-	-	-									
Diameter of hole,	-	-	-	-	inches	$\frac{1}{8}$	3-16	$\frac{1}{4}$	5-16	$\frac{3}{8}$	7-16	$\frac{1}{2}$	9-16
Thickness,	-	-	-	-	inches		3-16	$\frac{1}{4}$	5-16	$\frac{3}{8}$	7-16	$\frac{1}{2}$	9-16
Greatest distance will punch from edge,	-	-	-	-	inches	2 $\frac{1}{2}$	3 $\frac{1}{2}$	4 $\frac{1}{4}$	6	7 $\frac{1}{4}$	8 $\frac{1}{2}$	9 $\frac{3}{4}$	11 $\frac{1}{4}$
Diameter of hole in bed,	-	-	-	-	inches	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	3	4	4	5	5
Diameter of socket in die holder,	-	-	-	-	inches	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	2	2	2
Diameter of socket in slide bar,	-	-	-	-	inches	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
Length of levers,	-	-	-	-	feet	1 $\frac{1}{2}$	2 $\frac{1}{4}$	4	5 $\frac{1}{2}$	6	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$

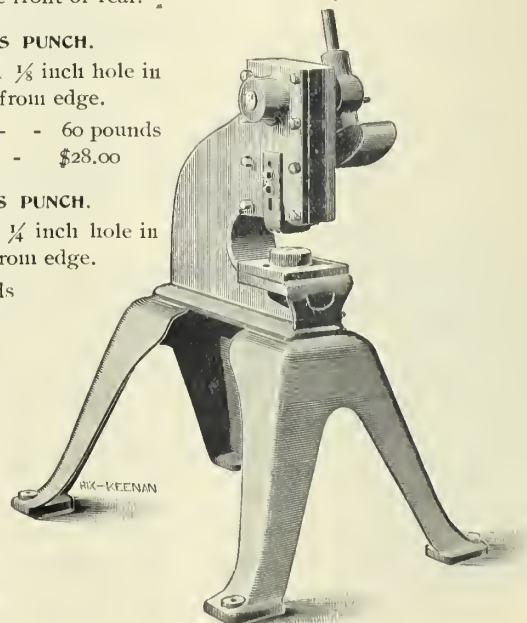
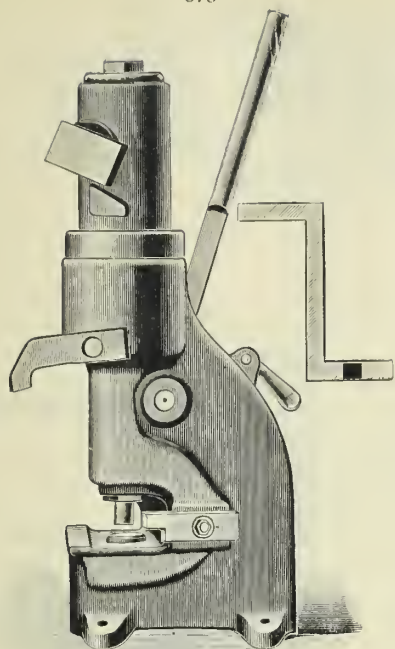


FIG. 573.



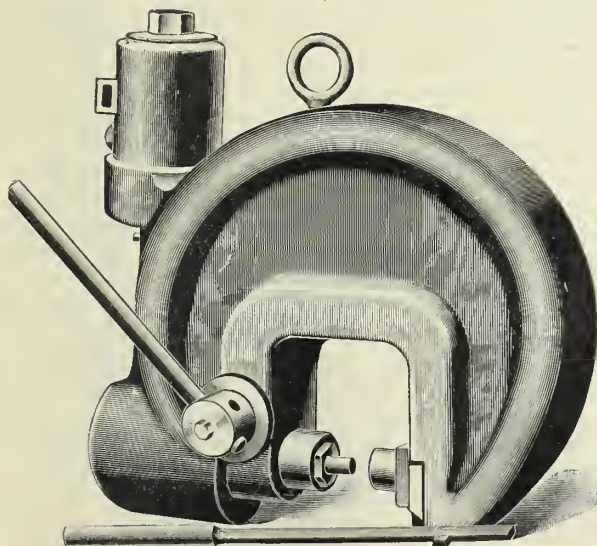
HYDRAULIC PUNCH.

FOR WEB OF CABLE SLOT RAIL.

(Description Fig. No. 574.)

In building cable railroads it was found necessary to have a punch which would punch the hole for the tie bolt, in the web of the slot rail ("Z" bars) when both slot rails were in place and the track laid, it being impossible to lay out the holes before. This made it necessary that the jaws of the punch should be raised from below, have an opening large enough to let the base of the rail pass the die and the punch, also to have the punch short enough to be dropped down between the slot and wheel rails and yet be convenient for operation. These requirements were all filled by the tool here shown, which has the position of the head and pump opening on jaw side of the punch and which has a depth of jaw of 5 inches, an opening of 7 inches and weighs about 300 pounds. The body is of steel, as in all of our punches of this character. For steel rails a shearing punch is advised. Two men were able to do with this the work of a gang of men with ratchets. Fitted with Gland No. 5, Punch No. 5, Die No. 5. Price, \$200.00.

FIG. 575.



HYDRAULIC PUNCH.

FOR WEB OF STREET GIRDER RAILS.

(Description Fig. No. 575.)

In punching street railroad girder rails of this pattern when in place a special form of our hydraulic punch has to be used. The head of the rail being very wide and the punch low down, none of our ordinary forms were convenient, which rendered this form of tool necessary. Our recent improvement, whereby the ram can be brought down to the work without the loss of time and labor of pumping has been augmented by placing the die in a sliding block which can be removed by simply raising a latch, thus getting a clear opening of five inches and at the same time keeping the length of the cylinder short enough to not be in the way of the work, the head smaller and the whole tool lighter. This form of tool can also be furnished for punching "I" beams. The tool is steadied by bringing the punch against the work, with the quick-acting lever, before beginning to operate the pumping lever. The upper socket must be brought down against the lug on the head before the quick-acting lever can be used.

No. 2 fitted with Gland No. 5, Punch No. 5. The Die is special.

Size.	Diameter of Hole.	Thickness.	Depth of Jaw.	Weight.	Price.
2	1 inch	½ inch (iron)	5 inches	280 pounds	\$225.00
3	1 inch	½ inch (steel)	5 inches	350 pounds	250.00
4	1¼ inches	½ inch (steel)	5 inches	650 pounds	325.00

HYDRAULIC PUNCH.

FOR BASE OF CABLE SLOT RAIL.

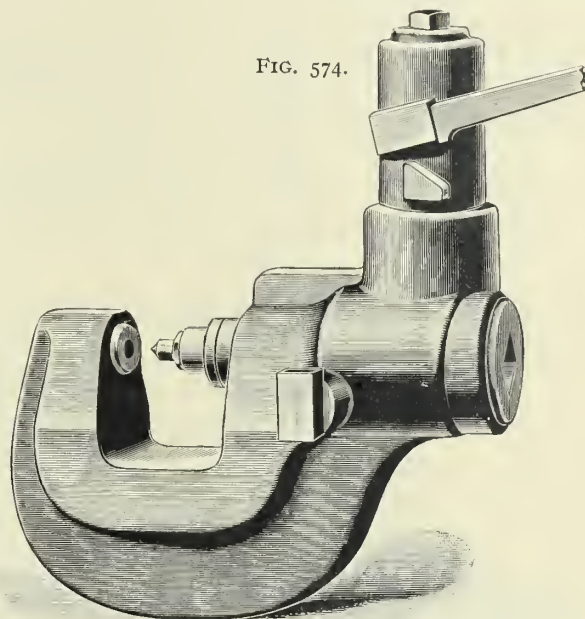
(Description Fig. No. 573.)

Another of the special requirements of cable railroad construction is a special form of a spike slot punch by which the bolt holes can be punched in the base of the slot or Z rails before or after being laid in position. On this tool clips are placed upon the front which drop into the cable slot, and hold the tool up, while gauges on the sides determine the position of the hole and act as strippers when withdrawing the punch. The center of the hole is regulated from the rear of the jaw. Two men were able to do with this tool the work which required seven men with a ratchet and at a small fraction of the time.

Fitted with New Standard Gland No. 5, Punch No 5, Die No. 4.

Price, - - - - - \$150.00

FIG. 574.



PRENTISS TOOL & SUPPLY CO.

HYDRAULIC PUNCH.

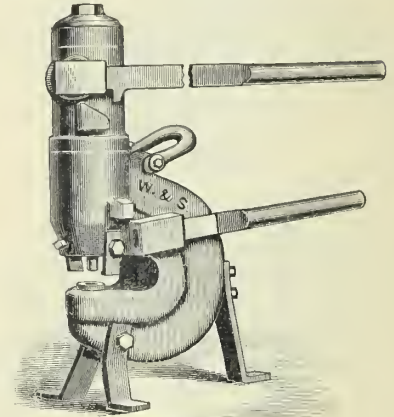
The punch is driven down by operating the pump inside the head or reservoir, the piston of which is connected to the socket in which the upper lever is shown. It is raised by bringing the socket down against the lug on head and pushing down the lower socket by a second lever, which does not interfere with that of the pump.

All parts are readily accessible, and very carefully designed. The head may be turned to bring the lever to any desired position, and irregular dies may be used without danger. Body and working parts are steel.

Size.	Diameter of Hole.	Thickness of Iron.	Depth of Jaw.	Number of Gland.	Number of Punch.	Number of Die.	Weight.	Price.
0	$\frac{7}{8}$ inch	$\frac{1}{8}$ inch	$1\frac{1}{2}$ inches	Special	Special	Special	30 pounds	\$85.00
1	$\frac{3}{4}$ inch	$\frac{1}{2}$ inch	$2\frac{1}{2}$ inches	4	4	4	105 pounds	110.00
1X	$\frac{3}{4}$ inch	$\frac{1}{2}$ inch	6 inches	4	4	4	140 pounds	150.00
2	1 inch	$\frac{5}{8}$ inch	$2\frac{1}{2}$ inches	5	5	4	130 pounds	140.00
2X	1 inch	$\frac{5}{8}$ inch	$4\frac{1}{2}$ inches	5	5	4	165 pounds	175.00
3	$1\frac{1}{4}$ inches	$\frac{3}{4}$ inch	3 inches	6	6	5	220 pounds	175.00
3X	$1\frac{1}{8}$ inches	$\frac{3}{4}$ inch	4 inches	6	6	5	300 pounds	200.00
4	$1\frac{1}{4}$ inches	1 inch	$3\frac{1}{2}$ inches	7	7	6	325 pounds	225.00

One Round Punch and Die furnished with each tool.

FIG. 576.

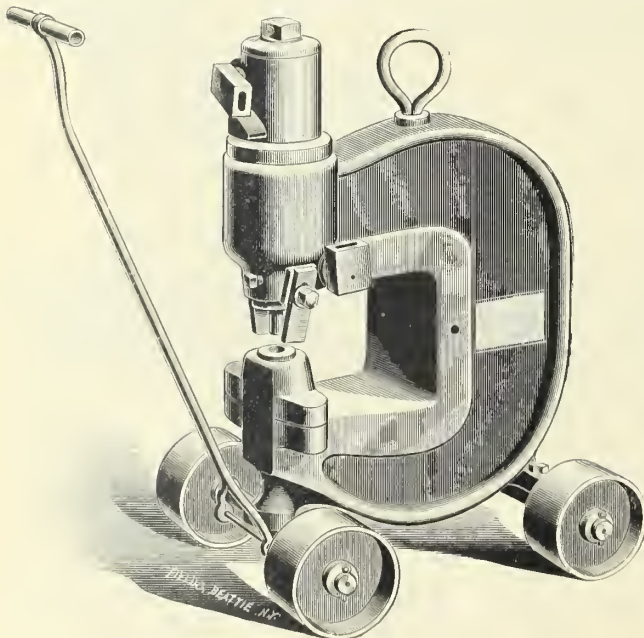


PORTABLE HYDRAULIC BEAM PUNCH.

9 INCH AND $12\frac{1}{2}$ INCH JAW PATTERN.

9 Inches. This punch is operated by a pump worked by a lever inserted in the socket shown on the side of the head. The parts are all easy of access and reliable, and the head may be turned to operate the lever from any position. The body of the punch is steel. The throat is 9 inches deep by $7\frac{3}{4}$ inches, allows a beam to be punched close to the flange or 9 inches from edge. It also allows angle or T iron to be punched without pushing lengthwise through the punch. Face of die to ground, $14\frac{1}{4}$ inches. One movement of the lever in the lower socket withdraws the punch entirely from the iron, or brings the punch down on the work without the labor and loss of time necessary to pump it down. The punches are prevented from turning, thus allowing the use of irregular shaped dies without danger of the punch coming down on the die. The hand-ring is put on for lifting or suspending the punch. Larger sizes to order. Capacity of punch, with one man on lever, 1 inch round hole in 1 inch iron. Weight, 645 pounds. Fitted with Gland No. 6, Punch No. 6, Die No. 5. Price, \$225.00.

FIG. 577.



12 $\frac{1}{2}$ Inches. This tool has a jaw $12\frac{1}{2}$ inches deep, 9 inches high. The edge of the jaw is only $1\frac{3}{4}$ inches from the edge to the center of the die. The truck wheels are 6 inches in diameter, and the height of die from the ground is $17\frac{3}{4}$ inches, thus permitting the punching of beams on flange as well as in the web. With reverse action the punch may be brought down at one motion on the work without the delay or labor of pumping. The head can be revolved so that the operator can stand in any convenient situation. All parts are easy of access for examination or repair. The body is all steel. The tool punches easily 1 inch hole in 1 inch iron. Is fitted with No. 6 Gland, No. 6 Punch and No. 5 Die. Weight, 800 pounds. Price, \$275.00.

PRENTISS TOOL & SUPPLY CO.

BOILER MAKERS' STEEL SCREW PUNCHES.

SIZES, PRICES, ETC.

No. 00, punches	$\frac{5}{16}$ inch hole in	$\frac{1}{4}$ inch iron, 1½ inches from edge of sheet,	-	Price, \$	-	14 pounds
No. 0, punches	$\frac{7}{16}$ inch hole in	$\frac{1}{4}$ inch iron, 1½ inches from edge of sheet,	-	Price,	-	17 pounds
No. 1, punches	$\frac{1}{2}$ inch hole in	$\frac{5}{16}$ inch iron, 1½ inches from edge of sheet,	-	Price,	-	27 pounds
No. 2, punches	$\frac{3}{4}$ inch hole in	$\frac{1}{2}$ inch iron, 2 inches from edge of sheet,	-	Price,	-	40 pounds
No. 3, punches	$\frac{3}{4}$ inch hole in	$\frac{3}{4}$ inch iron, 2½ inches from edge of sheet,	-	Price,	-	60 pounds
No. 3½, punches	$\frac{3}{4}$ inch hole in	$\frac{3}{4}$ inch iron, 3½ inches from edge of sheet,	-	Price,	-	100 pounds
No. 5, punches	1 inch hole in	1 inch iron, 4 inches from edge of sheet,	-	Price,	-	150 pounds
One punch and die furnished. Extra punches and dies, per pair, Nos. 00 and 0, \$; Nos. 1 and 2, \$; No. 3, \$						

REINFORCED JAW STEEL SCREW PUNCHES.

(Description, etc., Fig. No. 578.)

These punches are made from an extra quality of steel. The threads are carefully and smoothly cut in the body and on the screw, not a rough or loose fit, which is destructive to the work, and also to the punches and dies.

PRICE LIST AND SIZES.

Size.	Size of Hole.	Iron.	Depth of Jaw.	Punch	Punch Gland.	Die.	Weight.	Price.
0	$\frac{7}{16}$ inch	$\frac{1}{4}$ inch	2 inches	3 inches	3 inches	1 inch	21 pounds	\$24.00
1	$\frac{9}{16}$ inch	$\frac{3}{8}$ inch	2½ inches	4 inches	4 inches	3 inches	38 pounds	30.00
1A	$\frac{5}{8}$ inch	$\frac{3}{8}$ inch	5 inches	4 inches	4 inches	3 inches	50 pounds	40.00
1B	$\frac{13}{16}$ inch	$\frac{1}{2}$ inch	3¾ inches	5 inches	5 inches	4 inches	75 pounds	45.00
1C	$\frac{13}{16}$ inch	$\frac{1}{2}$ inch	6 inches	5 inches	5 inches	4 inches	88 pounds	55.00
2	$\frac{13}{16}$ inch	$\frac{1}{2}$ inch	2¾ inches	5 inches	5 inches	4 inches	70 pounds	40.00
3	$\frac{13}{16}$ inch	$\frac{5}{8}$ inch	3 inches	5 inches	5 inches	4 inches	96 pounds	60.00
3A	$\frac{13}{16}$ inch	$\frac{3}{4}$ inch	3¾ inches	5 inches	5 inches	4 inches	105 pounds	70.00

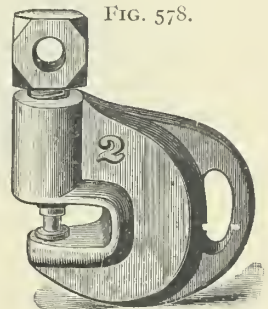
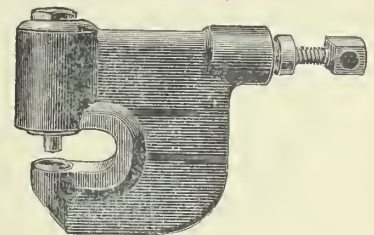


FIG. 579.



HYDRAULIC SCREW PUNCH.

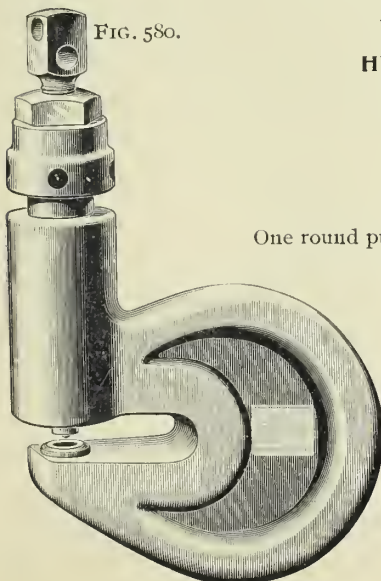
HORIZONTAL, SCREW.

HYDRAULIC SCREW PUNCH.

UPRIGHT SCREW.

(Dimensions Fig. Nos. 579, 580.)

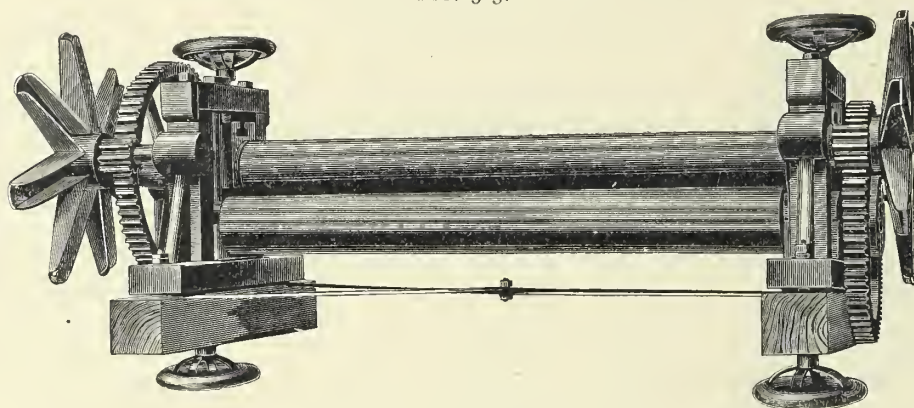
One round punch and die furnished with each tool. Square or oval punches double the price of round. Extra punches and dies.



Size.	Diameter of Hole.	Thickness of Iron.	Depth of Jaw.	No. of Gland.	No. of Punch.	No. of Die.	Weight.	Price.
1	$\frac{11}{16}$ inch	$\frac{3}{8}$ inch	2 inches	4	4	3	45 pounds	\$64.00
2	$\frac{13}{16}$ inch	$\frac{1}{2}$ inch	2¾ inches	5	5	4	70 pounds	90.00
3	$\frac{15}{16}$ inch	$\frac{3}{4}$ inch	3¾ inches	5	5	4	110 pounds	110.00
4	$\frac{15}{16}$ inch	1 inch	4 inches	6	6	4	160 pounds	140.00

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FIG. 583.



HAND POWER BENDING ROLLS.

FOR BOILER MAKERS AND SHEET IRON WORKERS.

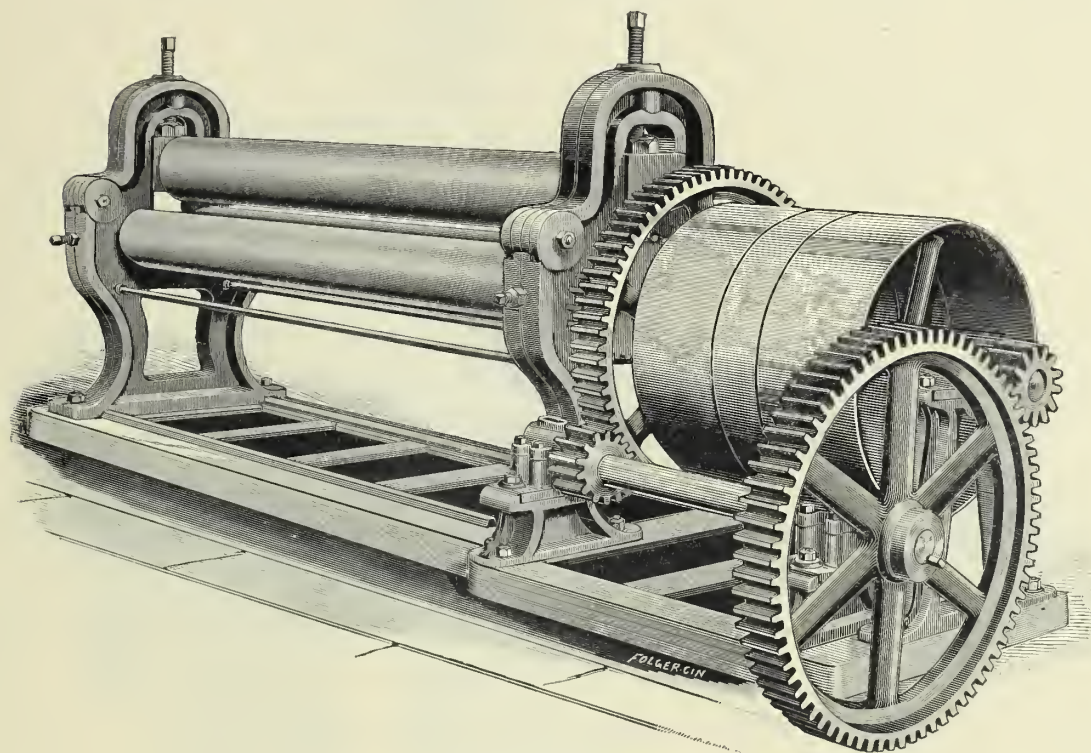
LIST OF SIZES AND PRICES OF BENDING ROLLS.

Diameter of Rolls.	Length of Rolls between Housings.	Weight.	Price Rolls of Wrought Iron.	Price Roll of Steel.
2½ inches	26 inches	300 pounds	\$	\$
3 inches	32 inches	325 pounds		
3½ inches	36 inches	500 pounds		
4 inches	40 inches	1000 pounds		
4½ inches	40 inches	1100 pounds		
5 inches	40 inches	1600 pounds		
5 inches	50 inches	1800 pounds		
5½ inches	50 inches	2000 pounds		
5 inches	62 inches	2000 pounds		
5½ inches	62 inches	2200 pounds		
6 inches	50 inches	2300 pounds		
6½ inches	50 inches	2550 pounds		
6 inches	62 inches	2600 pounds		
6½ inches	62 inches	2900 pounds		
7 inches	50 inches	3000 pounds		
7 inches	62 inches	3400 pounds		
7½ inches	62 inches	3700 pounds		
7 inches	74 inches	3750 pounds		
7½ inches	74 inches	4150 pounds		
8 inches	74 inches	4600 pounds		
8 inches	86 inches	5100 pounds		

We can furnish other sizes with longer or shorter rolls, with back-gearing, double or single.

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FIG. 584.



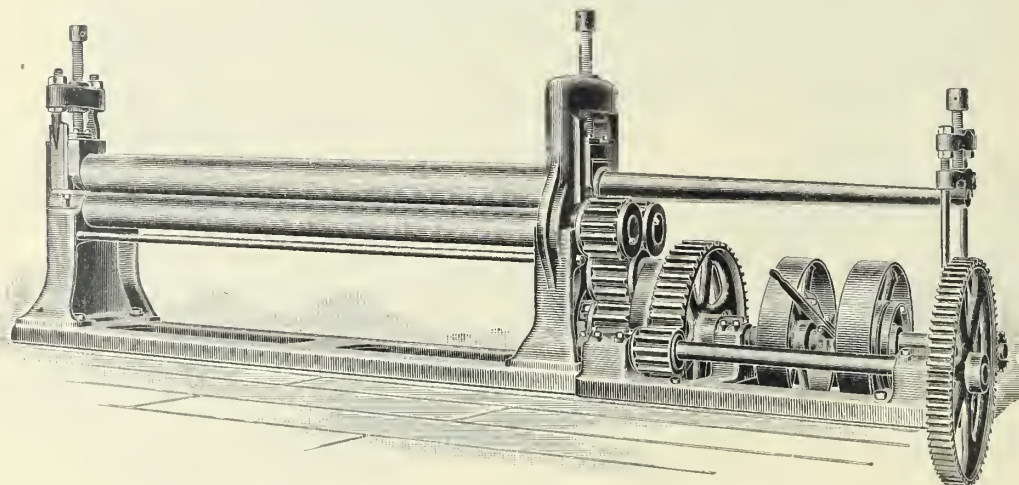
BENDING ROLLS.

WE build bending rolls of various capacities, but all substantially on the same plan. There are three rolls, the two lower being geared together, while the top roll is run by the friction of the plate. This roll is adjusted to suit the thickness of the plate or the desired curvature by means of a lever screw in each of the housings. The housings are hinged to facilitate the removal of the rolled ring. The rolls are made of solid wrought iron, and mounted complete on a cast iron bed plate. They can be furnished either for hand or power bending. The power rolls are fitted either with tight and loose pulleys or with friction pulleys for running and reversing. Prices on application.

Size.	Diameter Top Roll.	Diameter Bottom Rolls.	Distance Between Housings.	Weight.	Price.
No. 1	4¾ inches	4 inches	4 feet 0 inches	1750 pounds	
No. 2	5½ inches	4½ inches	5 feet 0 inches	2850 pounds	
No. 3	6 inches	5¼ inches	6 feet 0 inches	4250 pounds	
No. 4	7½ inches	6½ inches	7 feet 2 inches	7150 pounds	
No. 5	8¾ inches	7¾ inches	8 feet 2 inches	9100 pounds	
No. 6	8¾ inches	8 inches	8 feet 6 inches	10900 pounds	
No. 7	9½ inches	8¾ inches	10 feet 2 inches	14500 pounds	
No. 8	10½ inches	9 inches	10 feet 6 inches	17500 pounds	
No. 9	11¼ inches	9¾ inches	12 feet 2 inches	21800 pounds	
No. 10	12 inches	10½ inches	12 feet 2 inches	28000 pounds	
No. 11	12¾ inches	11 inches	14 feet 2 inches	32600 pounds	
No. 12	13 inches	11½ inches	14 feet 2 inches	38000 pounds	
No. 13	13¾ inches	12 inches	16 feet 2 inches	43200 pounds	

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FIG. 585.



POWER BENDING ROLL, WITH FRICTION PULLEYS.

THE above illustration represents our regular type of machine for bending boiler plate up to $\frac{3}{4}$ inches in thickness. The rolls are mounted on a heavy iron base plate, making a rigid, substantial construction, which does not require an expensive foundation.

The rolls are steel or wrought iron forgings, and have hinged housing for removing full circle plates. They are driven by friction pulleys.

This machine has top roll 11 inches diameter, bottom roll 8 inches diameter, and is 9 feet 2 inches between housings.

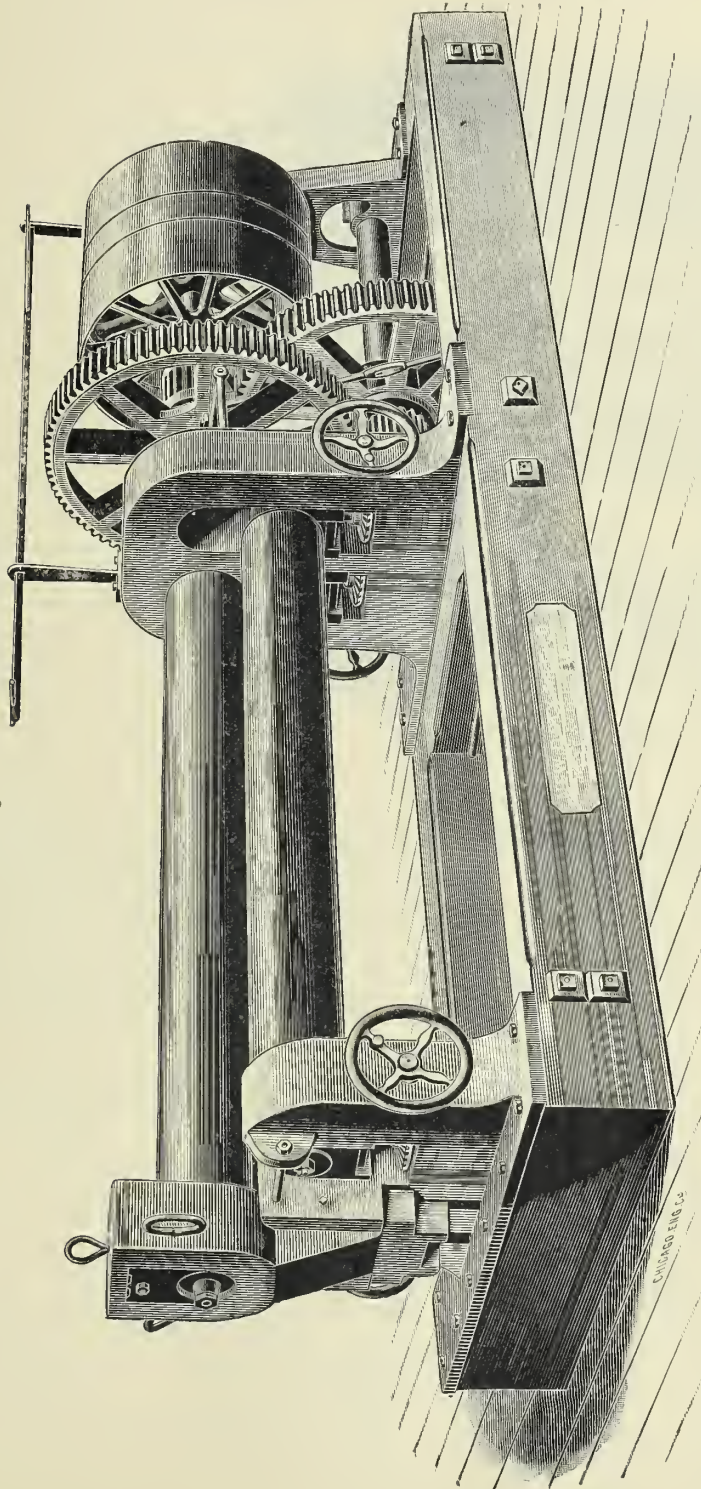
Prices and weights given on application.

In writing state greatest thickness and length of plate to be bent, also diameter of circle.

We are prepared to furnish all sizes and styles of rolls, for heavy or light duty, to be driven by tight and loose pulleys, friction pulleys, or reversing engines.

Correspondence solicited.

FIG. 586.



BELT POWER BENDING ROLLS.—ALL SIZES.

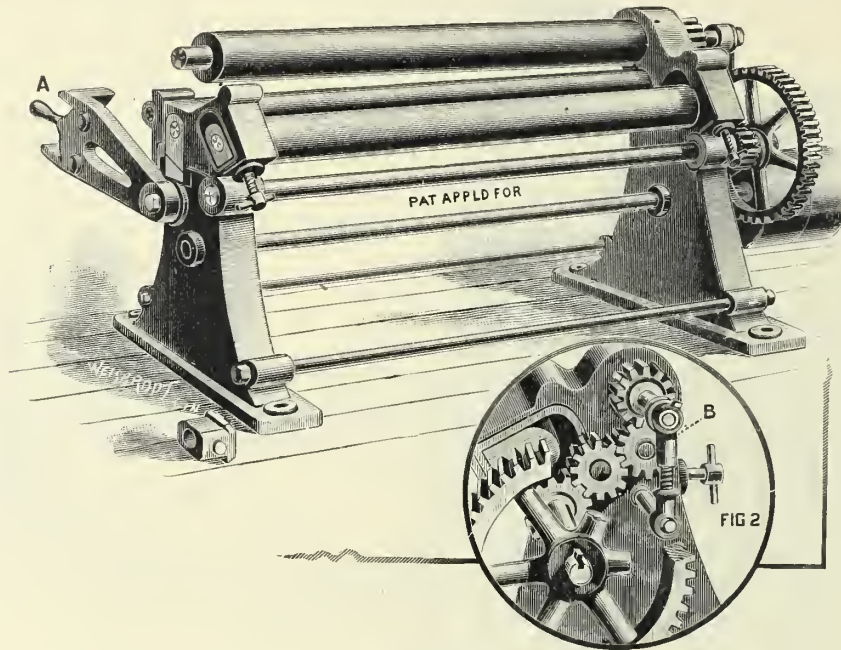
WE illustrate our Belt Power Bending Rolls. The illustration was made from a photograph of a set of rolls 9 inches in diameter and 100 inches between housings. They represent all sizes. We make these rolls in almost any desired size. If our correspondents will give us the diameter and length of roll required for their work, we can name them a special price on rolls adapted to the work. If they do not know what size they should have and will tell us the size of the largest sheet they wish to bend, we can then determine what size roll they should have.

The rolls are powerfully back-gearred. The two rolls that pinch the sheet are geared together. The housing on one end is hinged so that it can be dropped down out of the way to allow removal of sheet after it is bent to a circle. The rolls are of wrought iron or steel. They are raised or lowered by bevel gears or ratchets worked by hand. When the hinged housing is dropped down the top roll is held horizontal by a strap passing over the end and tightened by turn-buckles. This strap is on the same end of roll as the gears, and is shown in cut between two large gears.

We make these rolls of all sizes and any diameter or length.

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FIG. 587.



SLIP ROLLER.

THIS illustrates a new Slip Roller for boiler makers and all heavy sheet iron workers.

It is superior to all others, less complex, and more easily handled. The front bearing opens by lever A, which is keyed on to shaft, reaching to opposite end of the roll with eccentric on same. The top roll and eccentric are connected by link B, as shown in Fig. 2.

By opening front bearing the eccentric pulls down back roll and raises front part of same by one operation. Built in four sizes.

No. 1 is double geared, rollers of cast iron to work No. 16 gauge to $\frac{5}{8}$ inch plates, pulleys for right or left belt, parallel raising device, and from 60 to 90 inches long.

No. 2 is also double geared, steel rolls, with pulleys for right or left belt, to roll metal $\frac{1}{4}$ inch thick.

The rollers are raised by wedge and screw, which makes the seat of sliding boxes very firm and steady.

NO. 1 DOUBLE GEAR.

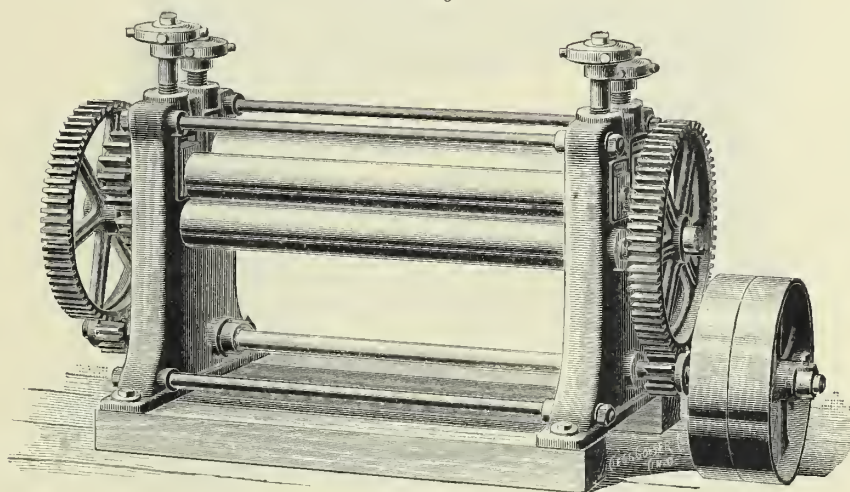
Length.	Diameter of Rolls.		Weight.	Price.
61 inches	6	and 8 inches	7600 pounds	
73 inches	7	and 8½ inches	8300 pounds	
85 inches	8½	and 9½ inches	10800 pounds	
98 inches	8	and 10 inches	13300 pounds	

NO. 2 DOUBLE GEAR.

Length.	Diameter of Rolls.	Weight.	Price.	Extra per 6 inches more or less.
60 inches	5 inches	2600 pounds		\$26.00
No. 3.	Single Gear.			Extra per 6 inches.
60 inches	4 inches	1900 pounds		\$18.00
No. 4.				
50 inches	3 inches	1100 pounds		\$12.00

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FIG. 588.



FIVE-ROLL STRAIGHTENER.

THE above illustration is of our Five-Roll Straightening or Leveling Machine. We construct it in three sizes with 3, 5 and 7 inch rollers, and of any width desired. They are built for all classes of work, and straighten from 22 gauge to $\frac{3}{16}$ inch iron or steel. The machine is furnished with tight and loose pulleys. It is shipped, mounted on oak skids, ready to operate. The capacity of No. 1 is 30 feet, No. 2 about 40 feet, and No. 3 about 45 feet, per minute. By running sheets through twice the result is very satisfactory.

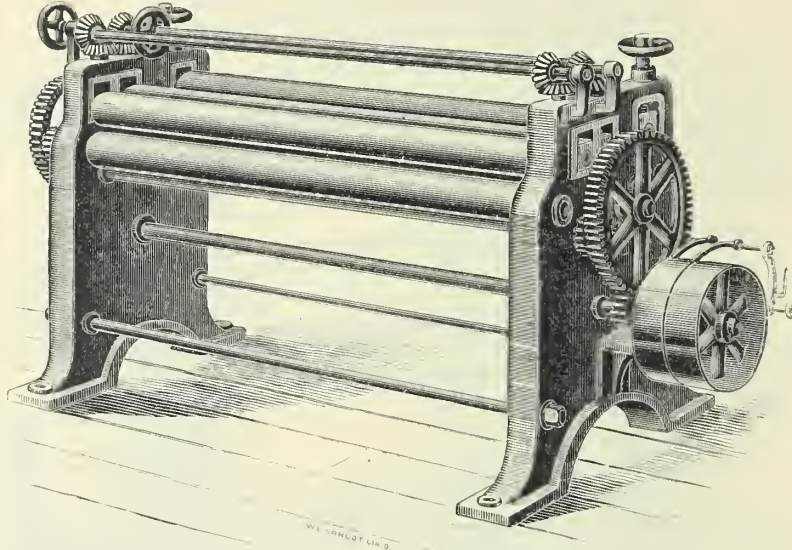
FIVE-ROLL STRAIGHTENING MACHINE.

		Length of Rolls.	Diameter.	Will Straighten.	Weight.	Price.	Extra per Inch more or less.
No. 1	- -	60 inches	5 inch	No. 8, 16 gauge	4500 pounds		\$5.00
No. 2	- -	60 inches	4 inch	No. 14, 22 gauge	3150 pounds		4.00
No. 3	- -	40 inches	4-3 inch	No. 18, 24 gauge	1950 pounds		3.25

No parallel raising device.

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FIG. 589.



EIGHT-ROLL STRAIGHTENER.

THIS illustrates our eight-roll straightening or leveling machine. We build it in three sizes and of different lengths to suit customer. These machines are double geared, rollers made of solid steel. No. 1 is generally used by manufacturers of gas holders, safe makers and heavy sheet-iron workers. Nos. 2 and 3 are used largely in sheet mills for straightening light iron. They are built with parallel raising device, so that both sides open at same time. We furnish tight and loose pulleys, but if ordered can arrange for three pulleys, so as to run heavy sheets, both backward and forward, which is sometimes desirable.

With our No. 3 machine, when used by galvanizers, the best results are obtained by putting the sheets through warm as they come from the kettles, when it will smooth uneven places and level the sheet at same time. The capacity is from 40 to 45 feet per minute.

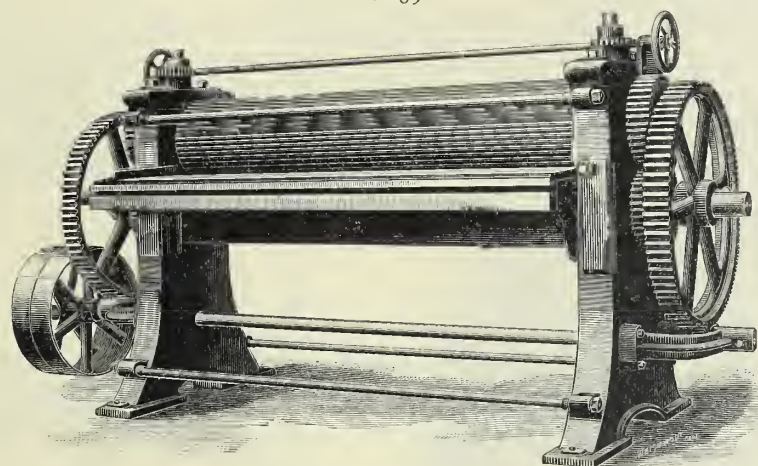
We do not claim that our rolls will do perfect work, but with a few days' experience they can be operated so as to improve sheets at least 75 per cent., and generally straighten them so that hammering is not necessary.

EIGHT-ROLL, STRAIGHTENING MACHINE.

	Length of Rolls.	Diameter of Rolls.	Will Straighten.	Weight.	Price.	Price per Inch, Extra, more or less.
No. 1 - -	60 inches	5 inch	No. 8, 16 gauge	5650 pounds		\$9.00
No. 2 - -	60 inches	4 inch	No. 14, 22 gauge	3900 pounds		7.50
No. 3 - -	40 inches	4-3 inch	No. 18, 28 gauge	2200 pounds		6.00

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FIG. 590.



CRIMPING ROLL.

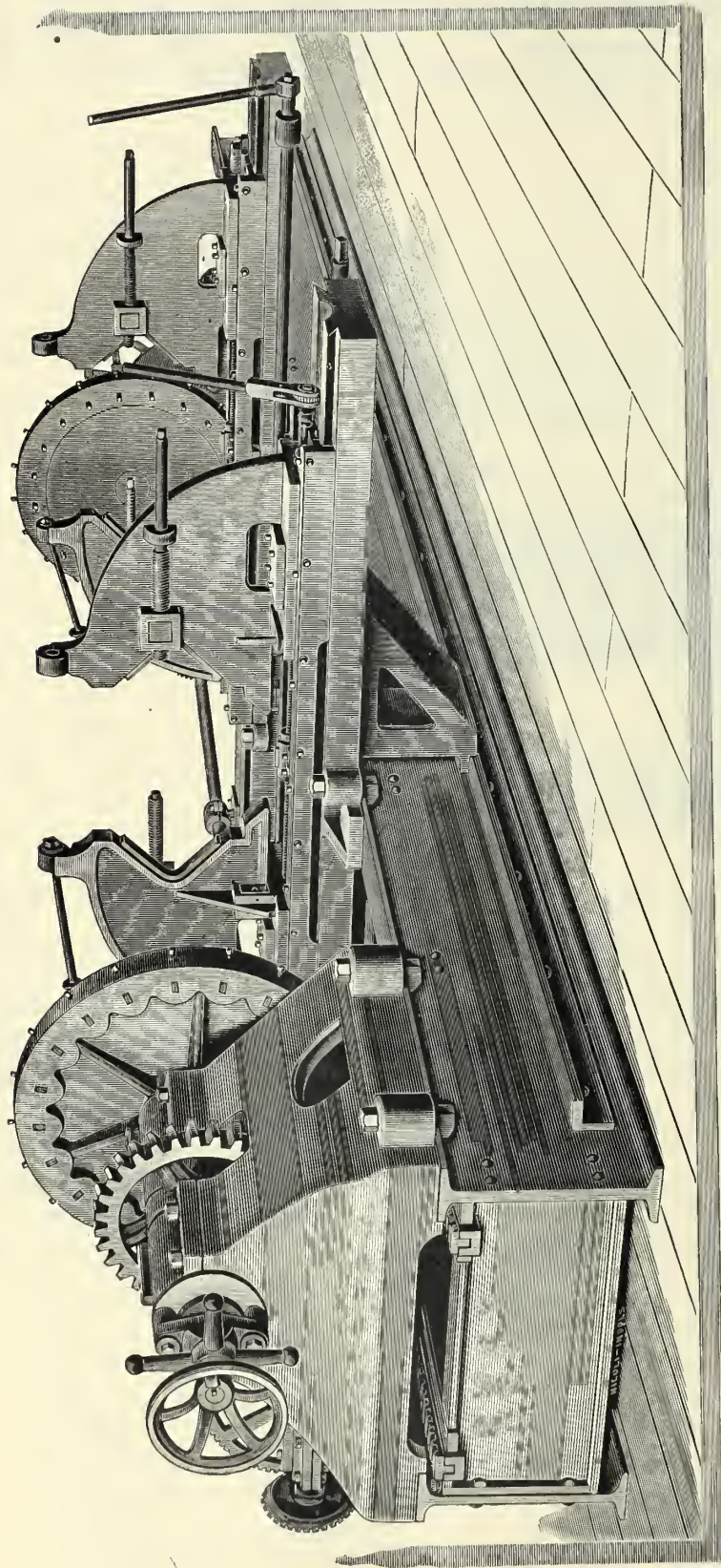
THIS represents our latest improved Crimping Roll, 60 inches wide, with 10 inch rollers and $\frac{5}{8}$ inch corrugations. The machine is double geared on the lower roll, and the top roller is driven from the lower by means of cut gearing on both ends, which keeps same from twisting. This top roll is also controlled by a geared parallel raising and lowering device which is operated from one end.

We have also a very important arrangement for setting the rolls so that the weight of top roll is taken from the screws and boxes and sets rolls so that they do not wear against each other when machine is running but not being fed. It is built in all sizes and widths to suit requirements and with either cast iron or steel rolls. When inquiring, please give thickness of material, width and depth of corrugations and distance necessary between housings.

Weight,

Price, \$

FIG. 591.

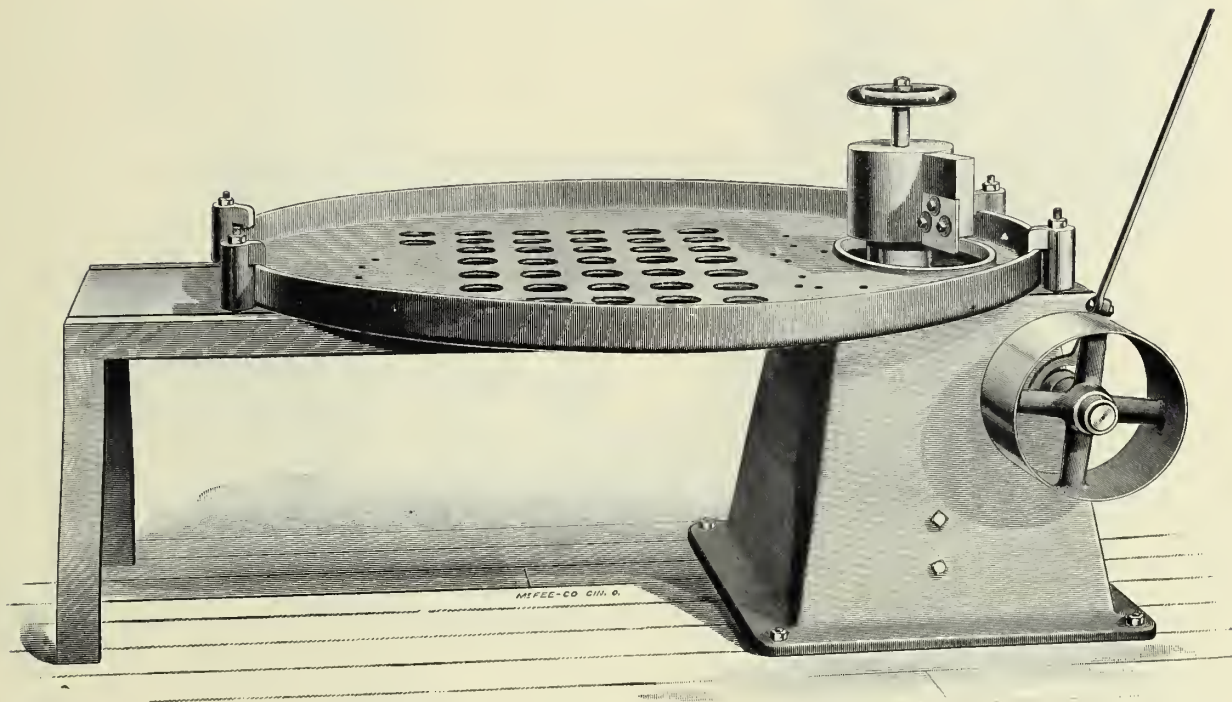


DUPLEX ROTARY COLUMN MILLING MACHINE.

IN construction this miller combines the essential advantages of the rotary planer, the milling machine, the single tool double-headed column lathe, and has marked improvements in all directions. Ordinarily the bed is made sufficiently long to receive columns varying in length from eight to twenty feet; the length, however, is not limited and may be made as desired. The face plates, or milling heads, contain twenty cutting tools each, and as the work is constantly advancing towards the cutters there are many of them operating at the same time, consequently it follows that although each tool may be making a cut of $\frac{1}{8}$ of an inch in depth the whole of the series will cut in one revolution of the head an amount equal to $\frac{1}{8} \times 20 = 2\frac{1}{4}$ inches, and the metal will be removed uniformly, steadily and without racking either the machine or the work. The diameter of the cutter heads is 36 inches at the cutters. The most radical departure from the design of the ordinary rotary planer lies in the substitution of a column feed for a cutter head feed; or, in other words, instead of the heads traversing the work, the work is advanced past the heads, which are stationary. By this construction is effected an economy of floor space and at the same time simpler construction of the machine, ease of handling and rigidity. Besides these apparent advantages, the great point is assured that the faced ends of the column will lie in parallel planes, and in the construction of a building will stand plumb, with the girders resting thereon flat and evenly. The machine is as nearly automatic as it is possible to make it; the carriages operate in unison and cannot get out of alignment; the cut may be taken in either the advance or the retrograde feed, or both; a rapid return is provided; a simple, strong and yet delicate method is used to govern the depth of cut, and this may be varied while the machine is in operation without stopping the work; the heads, carriages and all parts are adjustable laterally by a rapid rack movement; the clamping dogs are self-centering, and no attention need be paid to the setting of the column in the machine. All parts are simple and durable, and a skilled mechanic is not required to operate. The ordinary operating speed, is about one inch per minute feed; thus a column flange twelve inches square will be faced in twelve minutes. The machine is heavy and rigid in all of its parts, weighing, complete, 24,000 to 30,000 pounds. The spindles of the cutter heads are made of steel six inches in diameter. Although we make no claim that the machine is any other than a tool for the milling of columns, beams, etc., it will be at once evident to any mechanic that its use may be largely extended for the purpose of facing plates, cutting mitres, etc., by substituting a table for the clamping dogs, which may be removed for that purpose. If you wish to make the greatest amount of profit from your work you cannot afford to pass this machine without investigating its merits. We claim that it will accomplish more and better work than any other tool for the purpose on the market. All of the working parts of this tool are machined where required, but no extra cost has been put into useless finish. All unmachined parts are painted.

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FIG. 592.

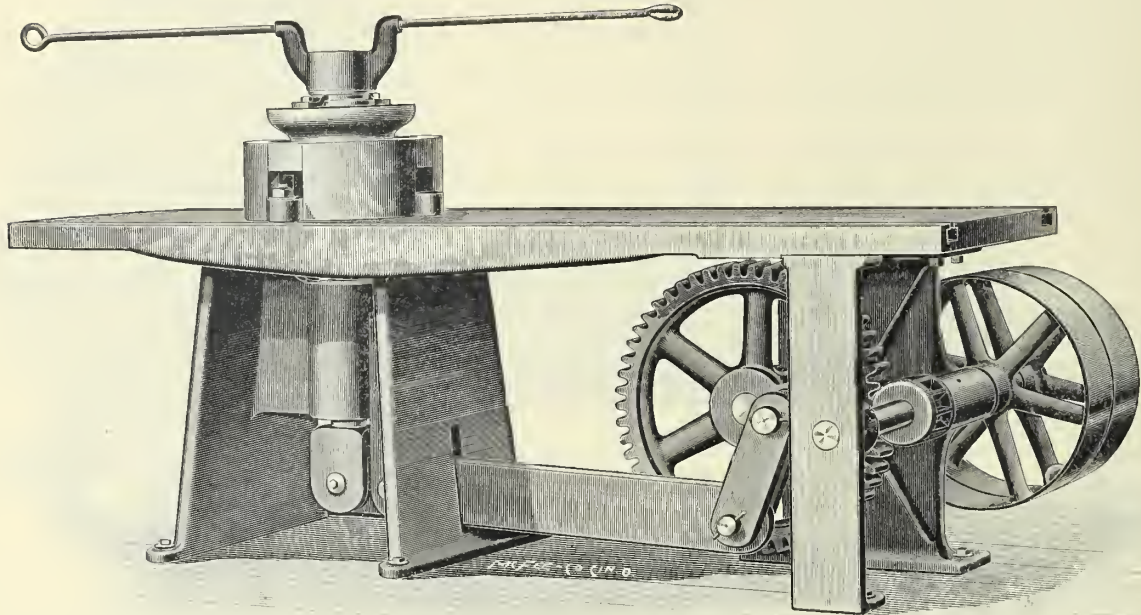


BOILER HEAD MAN-HOLE FACING MACHINE.

THE above cut represents Boiler Head Man-Hole Facing Machine with boiler head clamped in position by four clamping bolts which pass through heavy dogs, securely fastening the work to the table, it being provided with tee slots extending through its entire length, permitting boiler heads of the following diameters to be clamped thereon : 78, 72, 66, 60, 56, 54, 48, 36, 30 and 24 inches. Table mounted on cast base, 30 x 30—24 inches high, having a bearing 8 inches long in bottom of base. To receive steel spindle 5 inches diameter—31 inches long passing through bearing in table to receive facing head with cutter, the feed adjustment being regulated by a hand wheel on top of facing head as shown. The driving mechanism is very simple, consisting of a driving pulley, worm and worm-wheel. The worm and wheel run in oil, avoiding all danger of cutting or getting out of order. When facing off man-hole, flanges, etc., work may be done on this machine at a saving of 60 per cent. over any other method known of doing similar work. Diameter driving pulley, 12 by 6½ inch face, arranged with clutch, and lever for starting and stopping machine, dispensing with shifting belts, thereby avoiding delays and annoyance. Speed of driving pulley on machine should make 175 revolutions per minute. Weight of machine complete, 1800 pounds. Floor space required, 30 x 78 inches.

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FIG. 593.



NEW MAN-HOLE AND NOZZLE FORMING MACHINE.

DESCRIPTION.

THE machine illustrated is designed to press man-holes and nozzles in boiler heads and other similar work. It will be observed that complication has been dispensed with in its construction, making the tool extremely simple, consequently easily operated and not liable to break or get out of order under the severest duty.

Man-holes of the following sizes may be formed: 9 x 15 inches; 9 x 16 inches; 10 x 15 inches, and 11 x 16 inches. Nozzles from 6 to 18 inches, inclusive, ordinarily requiring from 8 to 10 minutes to form either of the sizes named. By referring to the cut the table is 24 inches wide, 78 inches long, mounted on heavy base 30 x 30 inches x 24 inches high, making total height 27 inches.

The base is provided with a central bearing 12 inches long, bored 3 inches to receive steel ram. A mild steel bar $1\frac{1}{4}$ x 40 inches is pivoted at end of ram by a steel pin $1\frac{1}{2}$ inches diameter. Two fulcrum bars are placed a short distance from center of ram, and secured in the base by a steel bolt $1\frac{1}{2}$ inches diameter, the lower end straddling the bar $1\frac{1}{4}$ x 40 inches, and secured thereto by a similar bolt $1\frac{1}{2}$ inches diameter. The outer end of this bar is provided with two steel connecting bars 1 x $3\frac{1}{2}$ inches x 12 inches, straddling the main bar, working loosely on $1\frac{1}{2}$ inches steel bolt, the upper ends working on steel wrist pin $1\frac{1}{8}$ inches diameter, securely fastened to spur gear. As shown, the large spur is keyed to shaft $2\frac{7}{8}$ x 20 inches, working in bearing 14 inches long of heavy stand.

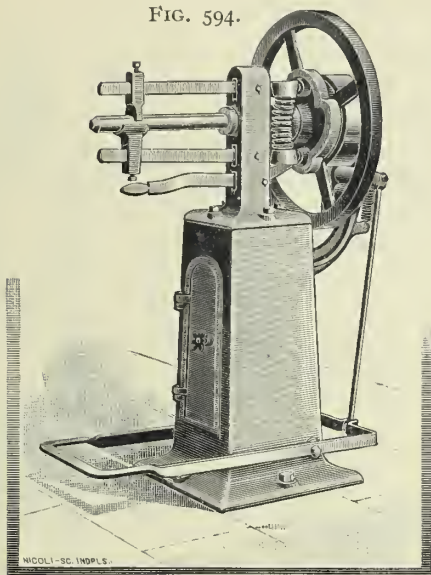
A shrouded pinion is keyed to driving shaft, one end working in main stand, the other having its bearing in outer stand. The machine is driven by tight and loose pulleys 18 inches diameter, 7 inch face.

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FLUE-WELDING MACHINE.

(HERSCHELL PATENT.)

FIG. 594.

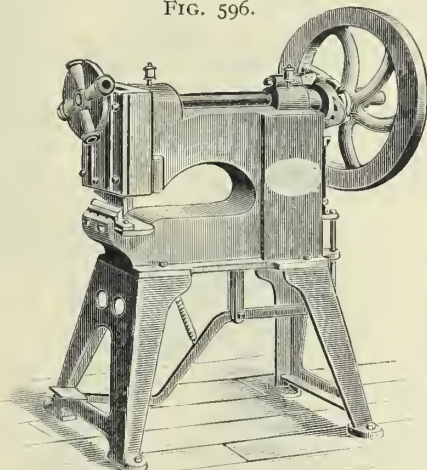


COMPLETE POWER MACHINE,
WITH PEDESTAL.

The machine shown in above cut is best adapted for shops where power may be had and where the repairing of flues is done in such quantity as to make the use of power an economy of labor as well as a convenience.

The pedestal is a box base with door and shelves for tools. Power is applied by belt to a friction pulley in rear of machine, which is operated by the foot treadle. For stretching the flue after the weld, the lower tool is tripped with the left hand by means of the hand lever shown in cut.

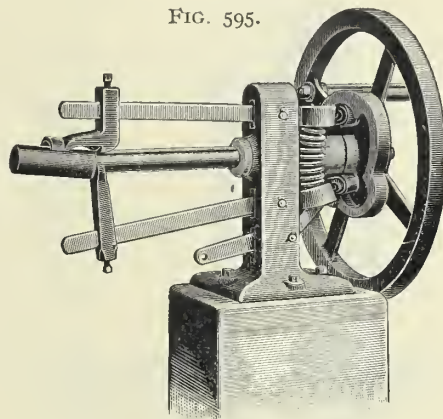
FIG. 596.



SMALL PUNCH PRESS.

The above illustration shows a Small Punch Press, which is used for light work. This machine is built in several sizes. It is provided with a new patented clutch motion. They are made with a very long bearing and an adjustable slide. The pattern may be changed for shorter or longer throat, and larger or smaller opening in bed jaw to meet requirements. Can also be used as a shear. When inquiring state what work is to be done on same. Price quoted on application.

FIG. 595.



HAND POWER MACHINE.

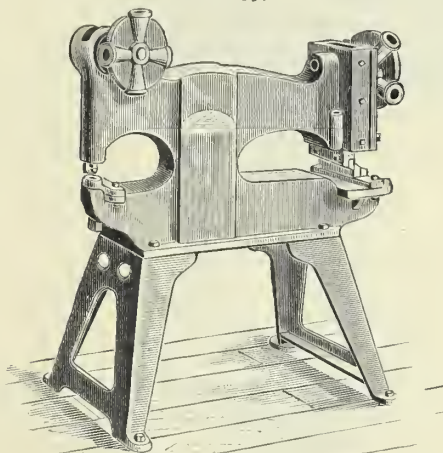
This machine is of the same construction as the one shown, excepting that it is arranged to be operated by hand instead of by power, and instead of for an iron pedestal, it is intended to be set upon a bench or any suitable support.

One complete set of tools for operating upon any given size of flue is furnished with each machine. These tools consist of scarfing and welding swages and spindle.

More than one set of tools will be extra. They may, however, be readily made in any shop.

Complete Power Machine, with pedestal, - - - - -	\$120.00
Hand Power Machine, with pedestal, - - - - -	100.00
Hand Power Machine, plain, - - - - -	80.00

FIG. 597.



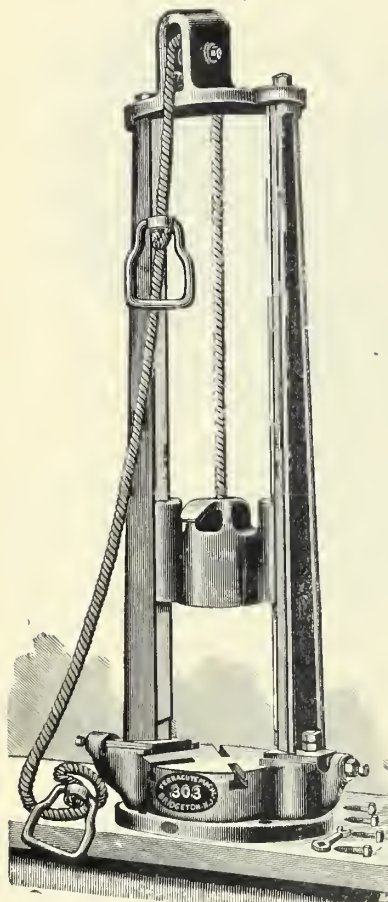
COMBINED HAND PUNCH AND SHEAR.

The Combined Hand Punch and Shear is built in one size, with 6 and 15 inch throats. Both sides can be used for punching, but the long side only for shearing. The 6 inch side punches $\frac{3}{8}$ inch hole through $\frac{3}{8}$ inch iron. The 15 inch end punches $\frac{1}{4}$ inch hole in $\frac{1}{4}$ inch metal. With each machine we furnish one $\frac{3}{8}$ inch, one $\frac{1}{4}$ inch, one $\frac{5}{16}$ inch die and punch, also one pair of slitting shears. All punches are made interchangeable.

Price, \$

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FIG. 598.



BENCH DROP PRESS.

(Description, etc., Fig. No. 598.)

THE Bench Drop Press 598, here illustrated, is arranged to fasten on to an ordinary work bench, and is intended for stamping the lettering, beads, &c., on articles such as blacking-box and canister covers, and like work already formed in other presses. It can also be used for forming up small work in tin, brass, silver, &c., where a sudden blow will best produce the shapes required. It is complete with pulley and rope, is provided with two stirrups, so it can be used by hand or foot power, and the slides are adjustable to allow for wear. The hammer can be held up off the work by a projecting hook, which engages with the upper stirrup.

Dimensions and price, &c., are given below.

Other sizes of Drop Presses will be quoted on application, also power lifters, &c.

Distance between uprights,	-	-	-	-	8¼ inches
Length of uprights,	-	-	-	-	37 inches
Weight of hammer,	-	-	-	-	50 pounds
Entire weight,	-	-	-	-	250 pounds
Price,	-	-	-	-	\$50.00
Pedestal, if desired, extra,	-	-	-	-	10.00

BENCH DROP PRESSES.

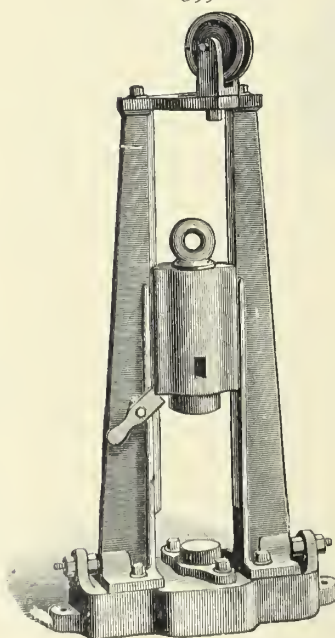
(Description Fig. Nos. 599 and 600.)

THE cuts represent 4½ inch and 6 inch Bench Drop Presses for light work. The die beds are fastened to the bed by two bolts on the 4½ inch. The 6 inch has poppets of steel. Stanchions are 4 feet high.

The stanchions are connected at the top with a cross brace, on which is mounted a sheave pulley, to raise the hammer.

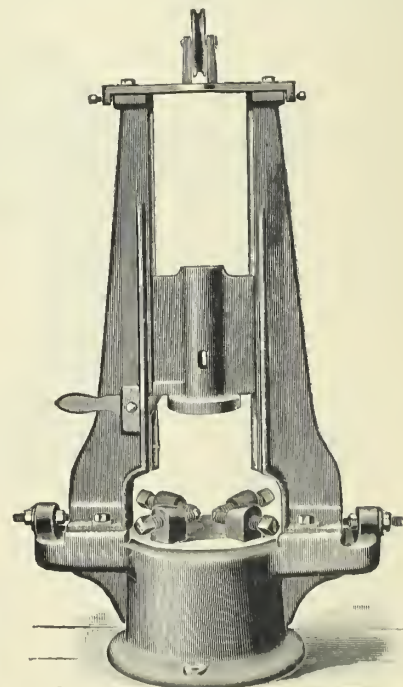
The V slides on all stanchions and hammers are hand scraped to a fit.

FIG. 599.



4½ INCH.

FIG. 600.

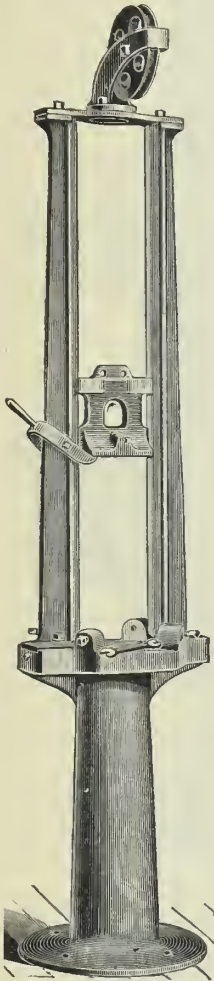


6 INCH.

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PORTABLE DROP PRESSES.

FIG. 601.



THE illustration shows portable drop press, with round base 22 inches in diameter at the bottom and 36 inches high. The rails are 5 feet long. The distance between poppets and between points of rails is 8 inches. The hammer can be made from 20 to 50 pounds. In this drop press the base is cored in order to adapt the weight of base to the light weight hammers. For using a hammer of 40 to 80 pounds weight, we cast the base solid.

Weight of press, with covered base for light weight hammers, 850 pounds. Weight of press with solid base for hammers 40 to 80 pounds, 1150 pounds.

FOUR POPPET DROP PRESSES.

WE will fit hammers to receive any tools, and make the form and weight as desired. The hammer is raised by aid of flanged pulley on an overhead shaft, by which the operator has the hammer under perfect control, and can deliver a light or heavy blow at will.

SPECIFICATIONS.

FOUR POPPET DROP PRESSES.

Made with heavy cast iron poppets and steel screws.

No.	Weight of Hammer.	Total Weight	Diam. of bottom of Base.	Height from floor to top of Base.	Length of Uprights.	Distance between Uprights.	Distance between Poppets.
1	80 lbs.	1250 lbs.	14 in.	27 in.	60 in.	7 3/4 in.	6 3/4 in.
1 1/2	120 lbs.	1850 lbs.	16 in.	29 in.	68 in.	9 in.	8 in.

SPECIFICATIONS.

FOUR POPPET DROP PRESSES.

Made with heavy wrought iron poppets and steel screws.

No	Weight of Hammer.	Total Weight.	Diam. of bottom of Base.	Height from floor to top of Base.	Length of Uprights.	Distance between Uprights.	Distance between Poppets.
1	99 lbs.	1000 lbs.	14 in.	27 in.	60 in.	7 3/4 in.	6 3/4 in.
2	150 lbs.	2000 lbs.	16 in.	29 1/2 in.	68 in.	9 1/2 in.	10 in.
2 1/2	175 lbs.	2500 lbs.	20 in.	29 1/2 in.	72 in.	9 1/2 in.	12 in.
3	250 lbs.	3500 lbs.	24 in.	30 1/2 in.	72 in.	12 in.	12 in.
4	350 lbs.	5000 lbs.	26 in.	33 in.	72 in.	14 in.	14 in.
5	500 lbs.	8500 lbs.				20 in.	

FIG. 602.

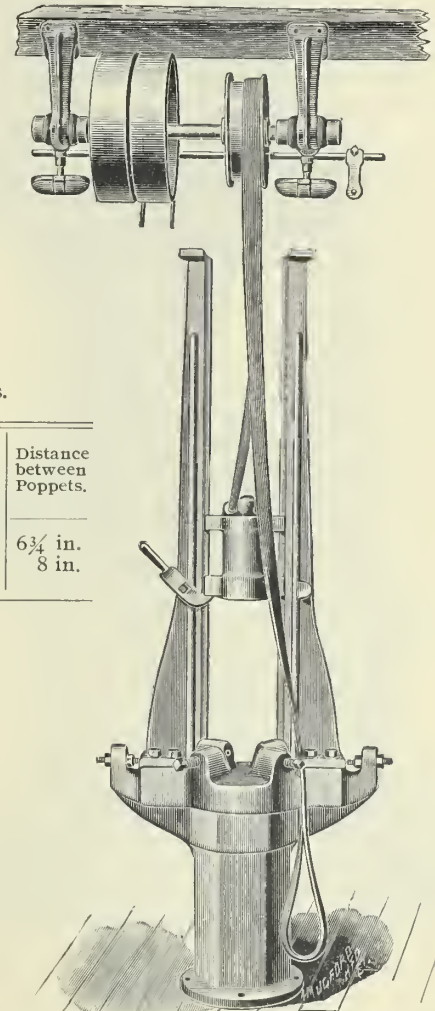
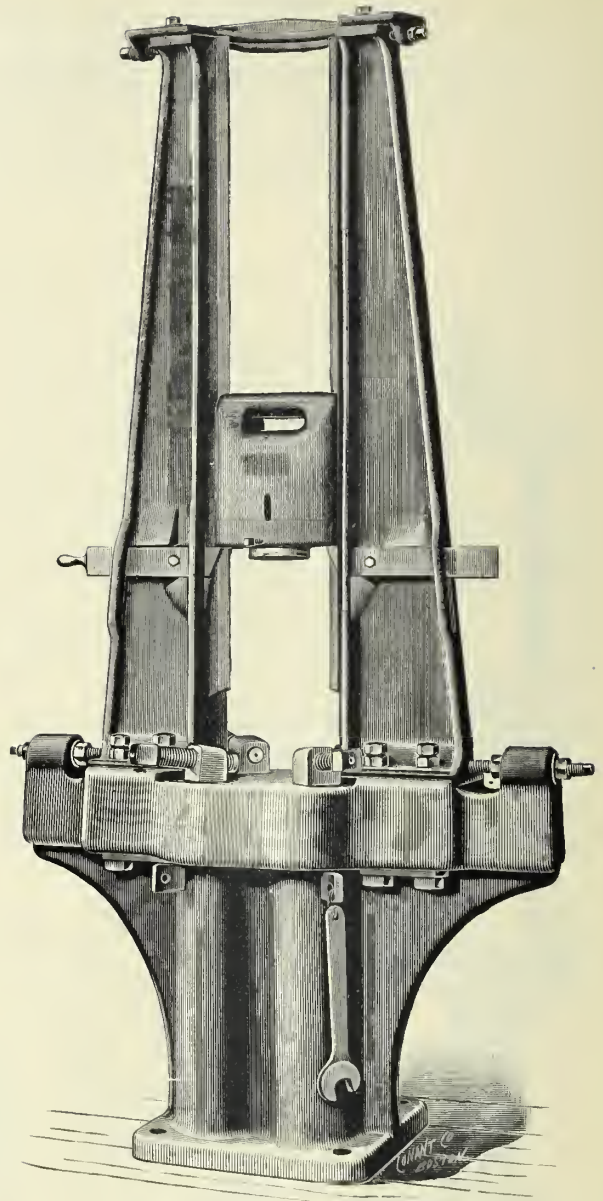
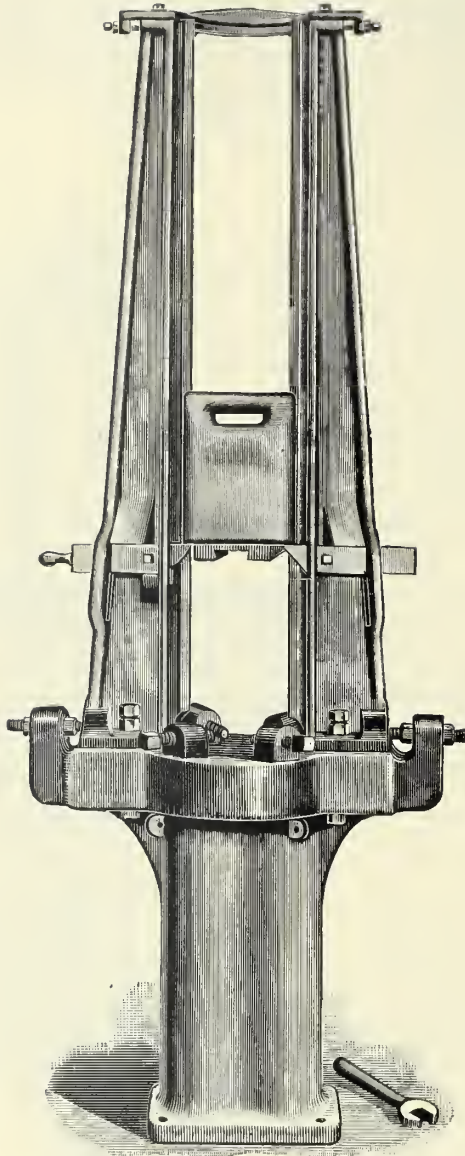


FIG. 604.



9, 12 AND 16 INCH DROP PRESS.

FIG. 603.



6 AND 7 INCH DROP PRESS.

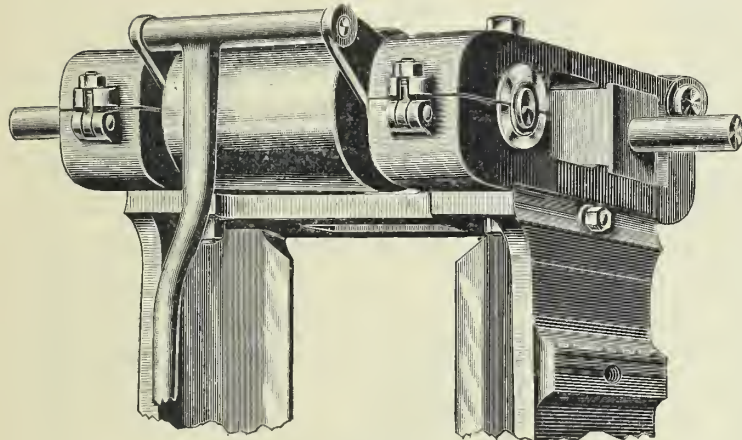
DIMENSIONS AND PRICES.

Prices include sheave pulley or flange pulley on top. Any size made to order.

Width between Poppets and Uprights.	Style.		Weight of Hammer About	Total Weight.	Price.
4½ inches	Bench		20-40 pounds	150 pounds	\$35.00
6 inches	Bench	Steel Poppets	25-50 pounds	600 pounds	85.00
7 inches	Light	Cast Iron Poppets	50-75 pounds	1200 pounds	100.00
6 inches	Light	Steel Poppets	60-100 pounds	1400 pounds	115.00
6 inches	Heavy	Steel Poppets	60-120 pounds	2000 pounds	140.00
9 inches	Light	Steel Poppets	75-125 pounds	2400 pounds	180.00
9 inches	Heavy	Steel Poppets	80-175 pounds	3200 pounds	225.00
12 inches	Light	Steel Poppets	100-200 pounds	3800 pounds	300.00
12 to 16 inches	Heavy	Steel Poppets	150-350 pounds	5000 pounds	350.00
16 to 24 inches	Heavy	Steel Poppets	200-400 pounds	7000 pounds	480.00

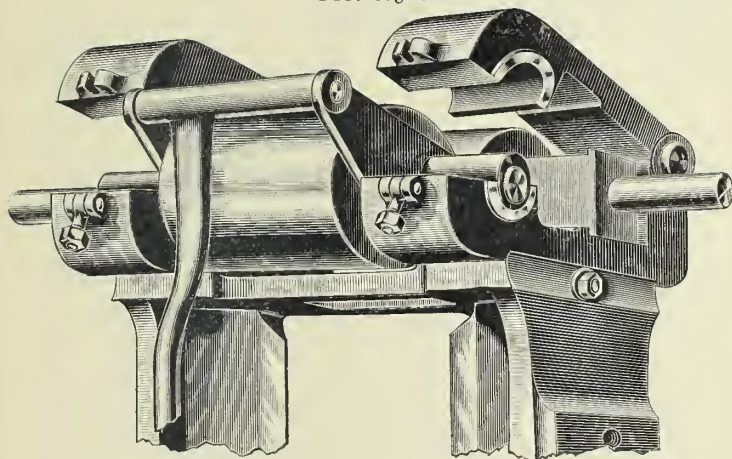
PRENTISS TOOL & SUPPLY CO.

FIG. 605



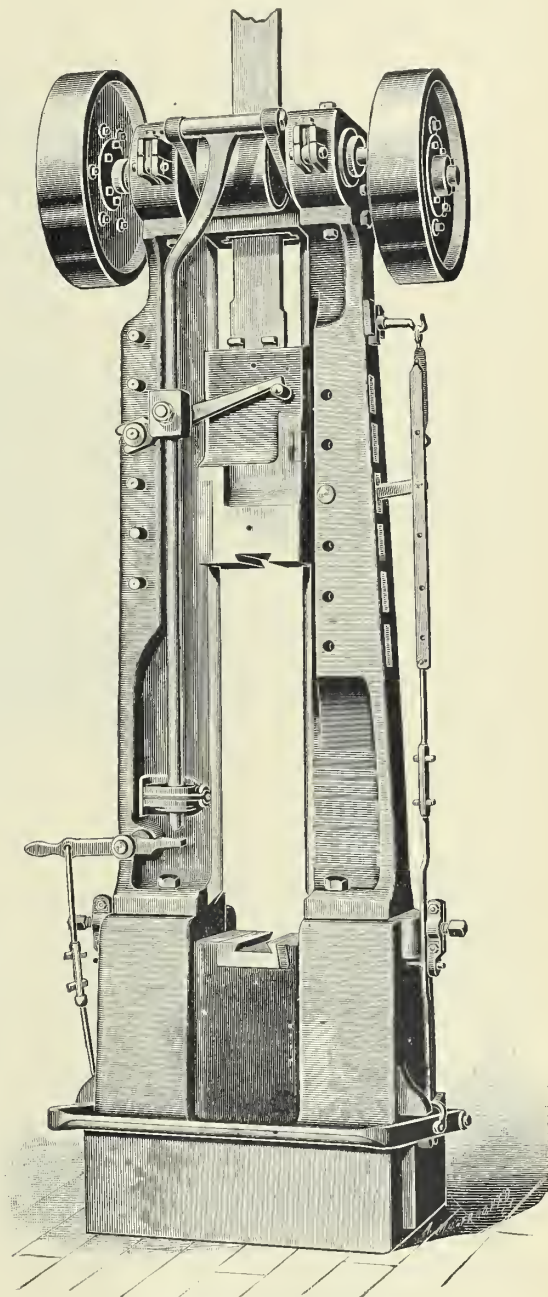
HEAD CONSTRUCTION.

FIG. 605A.



HEAD CONSTRUCTION.

FIG. 606.



DROP HAMMERS.



General Description of Figs. 605, 605A, and 606.

THE cuts on page 499 show the improved head construction of drop hammers also shown on same page. By loosening the nuts on two small swivel bolts and removing two head bolts, the caps can be swung open by means of the hinge joint in the rear, and any of the parts readily removed from the machine.

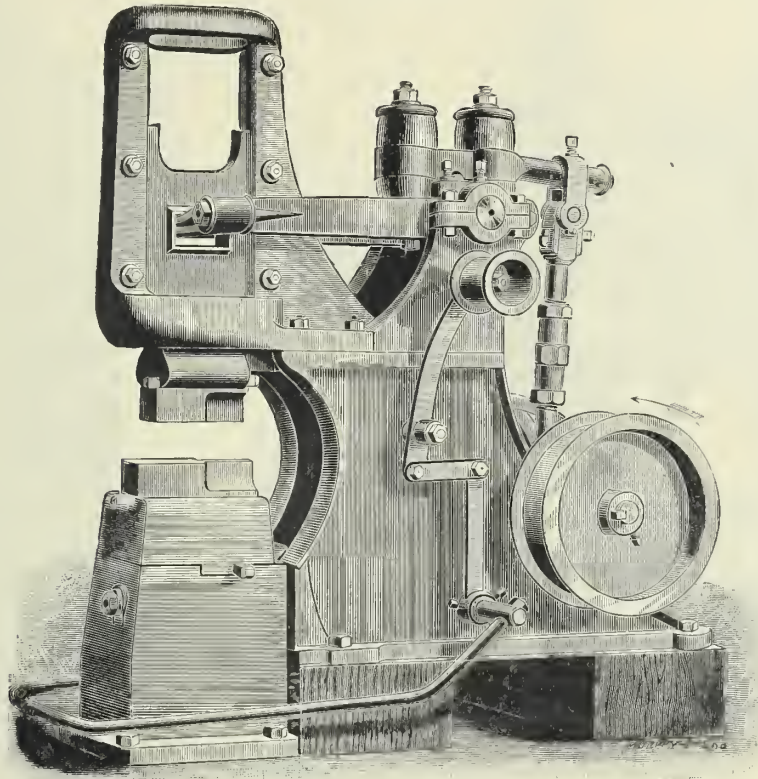
One feature of this Drop Hammer is the extra heavy castings that we use. This is not only desirable on account of strength, but also because the extra weight of metal tends to absorb the jar and vibration of the machine, and consequently reduces the necessity and expense of repairs. We have records of our hammers running two and three years without repairs being necessary, notwithstanding hard usage. We make all the hammers and shoes of wrought material, and our improved head admits of either front or back roll, or any of the boxes, bolts or screws being removed without the necessity of taking down the entire head. This is a large item in case of repairs.

SPECIFICATIONS.

Weight of Hammer.	Weight of Base.	Total Weight.	Length of Uprights.		Height from Floor to Top of Pulleys.		Between Uprights just above Base.	Between Ways on Uprights.	Size of Base at Bottom.	Diameter and Face of Pulleys	Revolutions per Minute.	Extreme Fall	
lbs.	lbs.	lbs.	Ft.	In.	Ft.	In.	In.	In.	In.	In.		Ft.	In.
400	7000	11000	7	3	11	7	13¼	10¼	36 x 29	26 x 6	120	4	8
500	7000	11500	7	3	11	7	13¼	10¼	36 x 29	26 x 6	120	4	8
600	9000	14000	7	3	11	9	17	14	43 x 32	30 x 7	100	4	5
800	10500	15000	7	3	12	1	17	14	43¼ x 32	30 x 7	100	4	5
1000	12000	17000	7	3	12	5	17	14	43½ x 32	30 x 7	90	4	3
1200	13500	19000	7	3	13	3	19	16	47¾ x 32	36 x 8	85	4	3
1600	15000	21000	7	3	13	3	19	16	48 x 32	36 x 8	80	4	
1800	16500	24000	7	3	13	4	21	18	48 x 32	38 x 9	75	4	
2000	16500	25000	7	3	13	4	21	18	48 x 32	38 x 9	75	4	

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FIG. 607.



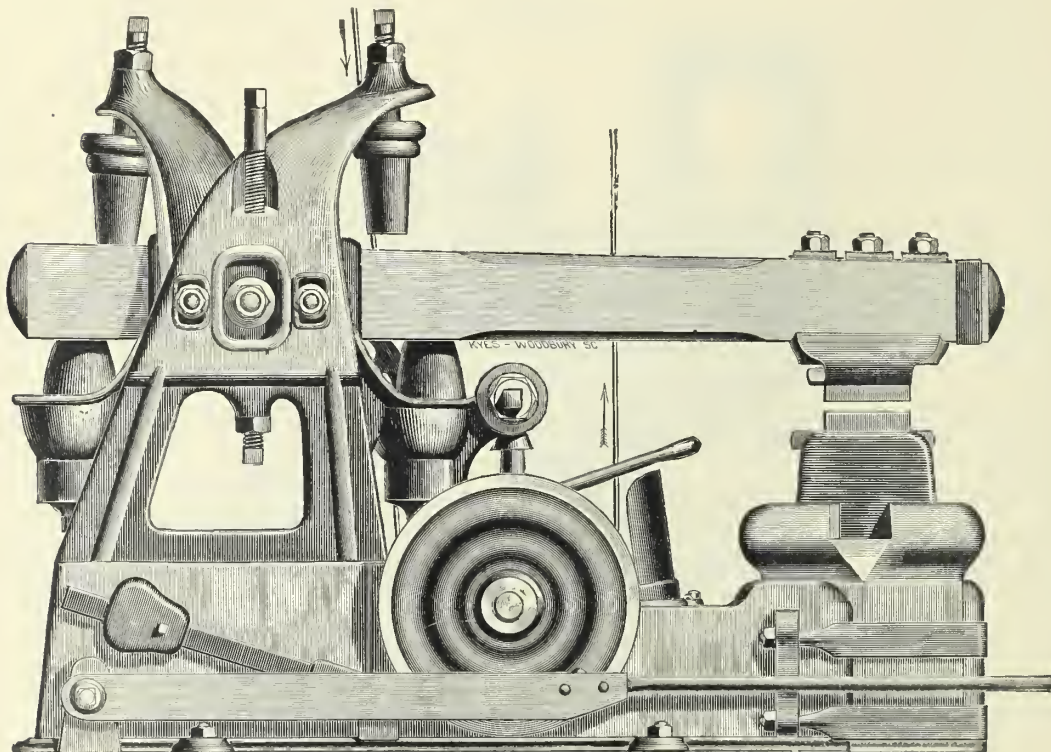
UPRIGHT POWER HAMMER.

THE general principles of the adjustable connection rod, the eccentric motion, the belt wheel with its tightener pulley, the fly wheel with its brake, the control of the blow by a foot treadle, and the separate anvil block, all thoroughly tested by many years' service in our Cushioned Helve Hammer, are preserved in this hammer. We have never found an excuse for changing them. The hammer is operated by an eccentric at the rear, connected by a pitman to the saddle or oscillator which carries the helve, and by this helve motion is imparted to the head or ram. By the use of a steel helve and the strap in connection with it, the force or weight of the blow of the ram is multiplied many times, but with a degree of elasticity that reduces danger of breakage, and at the same time so thoroughly cushions the jar that none is perceptible in the working parts of the hammer when the blow is struck. In this way the blow is made to imitate the action of a hand hammer, and is the nearest possible approach to that of the smith's arm attainable by mechanical ingenuity; the hammer head gets away from the work instantly after striking, and the work is not chilled. A common experiment with our hammer is to make a cold iron red hot with a few blows. In the matter of economy of power, it is conceded beyond argument that the merits of a properly constructed power hammer greatly overshadow those of a steam hammer, if power costs anything; and it has been an undisputed claim of ours that the power it takes to operate one steam hammer would run five Bradley hammers of corresponding sizes up to their full capacity, an unanswerable argument that fully covers the all-important question of economy. Our long experience in the manufacture of power hammers has naturally caused us to become familiar with all classes of forged work, and the severe tests of strength that many parts of a hammer are subject to. Having profited by this experience, we are able to judge of the best material to use and the proper proportion of each part, in order to secure the greatest durability. This same experience has also caused us to "make haste slowly," so much so that hammers of this style were in daily use in several factories besides our own for more than a year before bringing them to the public notice, so that now we are in position to give a strong guarantee with each hammer as to durability, as well as to the various other points that go to make up a successful tool of this character.

We are prepared to furnish these hammers in ten sizes, the weights of the hammer heads ranging from 15 pounds in the smallest to 500 pounds in the largest. Many times we can be of service in recommending the size most suitable for the work to be done, and always hold ourselves in readiness to give our customers the benefit of our experience.

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FIG. 608.



RUBBER CUSHIONED HELVE HAMMER.

BELOW we submit a table giving approximately the capacity of each size of the Rubber Cushioned Helve Hammer, together with an estimate of the power required :

1	2	3	4	5	*6	7
Size of Hammer.	Diameter of Driving Pulley.	Width of Belt.	Estimated Horse Power Required.	Average No. of Blows per Minute.	Average Size of Iron for which Suited.	Floor Space.
25 pounds	12 inches	3 inches	$\frac{3}{4}$ to 1	400	1 inch	68 x 29 inches
40 pounds	14 inches	4 inches	$1\frac{1}{2}$ to 2	300 to 315	$1\frac{1}{4}$ inches	82 x 34 inches
60 pounds	18 inches	6 inches	2 to $2\frac{1}{2}$	290 to 300	$1\frac{3}{4}$ inches	91 x 43 inches
80 pounds	18 inches	6 inches	$2\frac{1}{2}$ to 3	275	2 inches	96 x 48 inches
100 pounds	18 inches	6 inches	$2\frac{1}{2}$ to 3	275	$2\frac{1}{2}$ inches	96 x 48 inches
200 pounds	26 inches	8 inches	3 to $3\frac{1}{2}$	225 to 240	$3\frac{1}{2}$ to 4 inches	106 x 54 inches

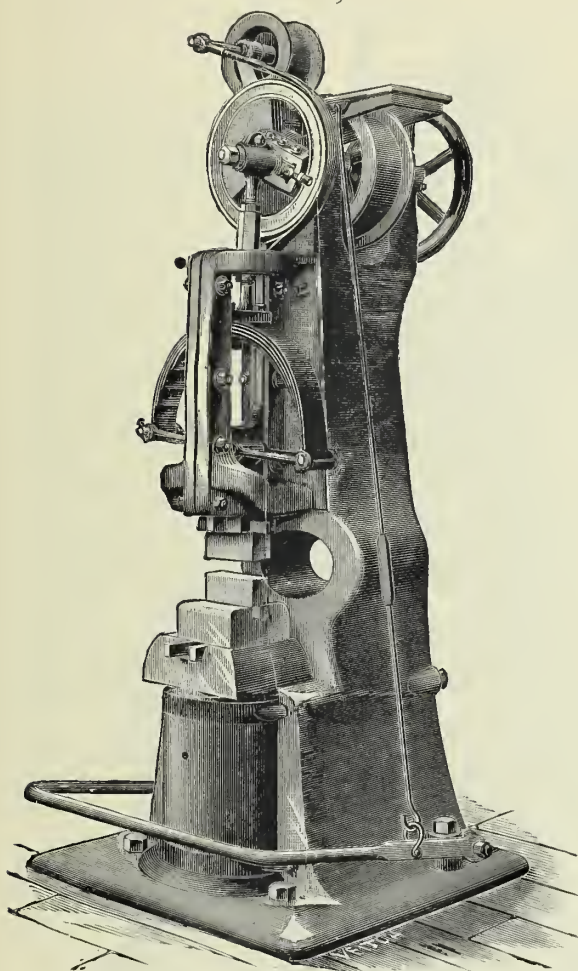
* These estimates are for iron. Reduce the size one-third for steel

SIZES AND PRICES.

Size.	Price.	Size.	Price.
15 pound head,	\$225	200 pound head,	\$1000
25 pound head,	300	40 pound head, especially for forks,	450
40 pound head,	450	60 pound head, especially for forks,	600
60 pound head,	600	70 pound head, especially for forks,	700
80 pound head,	750	70 pound head, short bed for plating,	700
100 pound head,	850	100 pound head, short bed for plating,	800

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FIG. 609.



THE IMPROVED UPRIGHT POWER HAMMER.

OCCUPIES less space ; requires less power ; is simple in construction ; works stock of greater extremes in size ; strikes a truer and firmer blow than any other hammer made with the same weight of ram.

The dies never rest together when the hammer is idle. The anvil block is separate from the frame.

Dies are adjustable to any position, only one man required, and the hammer is fully under his control to start or stop instantly.

SPECIFICATIONS.

Weight of Ram.	Size of Base.	Diameter of Driving Pulley.	Size of Belt.	Average Number of Blows per Minute.	Adapted to Work Stock.	Height from Foundation to Center of Shaft	Extreme Size of Dies.
25 pounds	26 x 26 inches	10 inches	3 inches	400	$\frac{1}{4}$ to 1 inch	5 feet 8 inches	5 x 6 inches
30 pounds	26 x 26 inches	10 inches	3 inches	400	$\frac{1}{2}$ to $1\frac{1}{4}$ inch	5 feet 8 inches	5 x 6 inches
40 pounds	36 x 35 inches	10 inches	$3\frac{1}{2}$ inches	400	$\frac{1}{2}$ to $1\frac{1}{2}$ inch	5 feet 9 inches	5 x 7 inches
50 pounds	36 x 35 inches	10 inches	4 inches	400	$\frac{1}{2}$ to $1\frac{3}{4}$ inches	5 feet 9½ inches	5 x 7 inches
60 pounds	37 x 37 inches	11 inches	$4\frac{1}{2}$ inches	350	$\frac{3}{4}$ to 2 inches	6 feet 0 inches	$5\frac{1}{2}$ x 8 inches
80 pounds	37 x 37 inches	11 inches	5 inches	350	$\frac{3}{4}$ to $2\frac{1}{2}$ inches	6 feet 2 inches	$5\frac{1}{2}$ x 8 inches
90 pounds	39 x 39 inches	14 inches	$5\frac{1}{2}$ inches	300	1 to 3 inches	6 feet 5 inches	$6\frac{1}{2}$ x 9 inches
100 pounds	39 x 39 inches	14 inches	6 inches	300	1 to $3\frac{1}{2}$ inches	6 feet 6 inches	$6\frac{1}{2}$ x 9 inches
125 pounds	47 x 48 inches	18 inches	$6\frac{1}{2}$ inches	275	$1\frac{1}{2}$ to $4\frac{1}{2}$ inches	7 feet 0 inches	$7\frac{1}{2}$ x 10 inches
150 pounds	47 x 48 inches	18 inches	$6\frac{3}{4}$ inches	250	2 to 5 inches	7 feet 2 inches	$7\frac{1}{2}$ x 10 inches
200 pounds	47 x 48 inches	20 inches	$6\frac{3}{4}$ inches	200	2 to $5\frac{1}{2}$ inches	7 feet 2 inches	$7\frac{1}{2}$ x 10 inches

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BEAUDRY CHAMPION POWER HAMMER.

PATENTED.

FIG. 610.

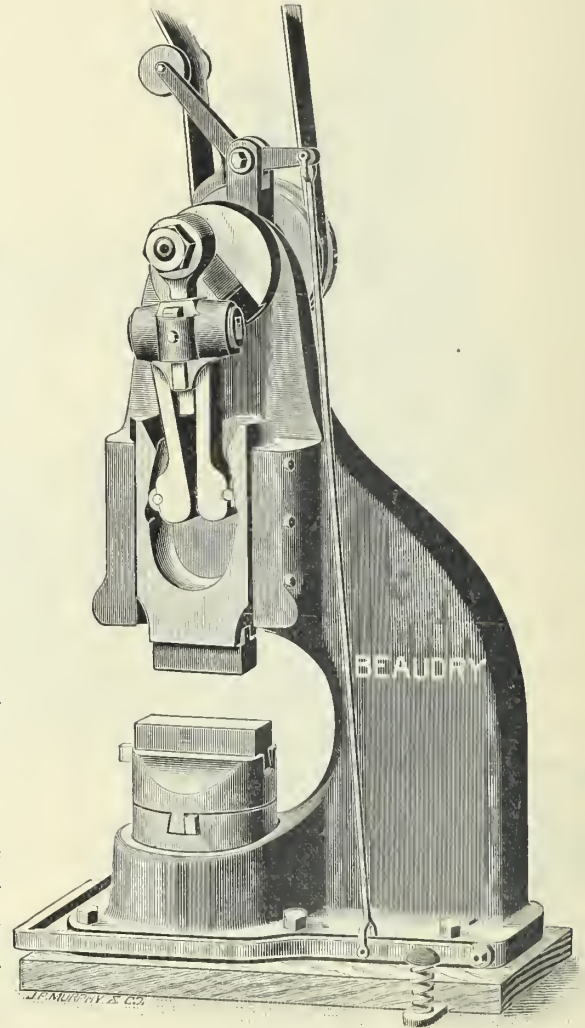
THIS illustration accurately represents the Beaudry Champion Hammer. As will be readily seen, upon examination of the cut, this hammer is of the simplest construction, possessing but few parts, yet is built upon scientific principles that all the essential features constituting a superior tool are obtained.

This hammer, it is claimed, is superior to other hammers now on the market, because of the greater elasticity of blow, its simpler construction, its more ready adjustability to various kinds of work and its greater economy of operation.

It will be seen that this hammer has no beam, no saddle, no rubber nor spiral springs, nor straps of any sort. It is direct acting, completely under the control of the operator, and can be instantly adjusted so that the full stroke can be had on a piece four inches square as readily as on a piece one-half inch in thickness.

No other hammer possesses this feature.

The power is obtained by a short shaft, twelve inches in bearing, having at one end a heavy slotted disc carrying an adjustable eccentric pin to which is attached the rod, which can also be adjusted, as shown, for short or long stroke; the rod slips through a spring box, which can, in turn, be instantly adjusted. The hammer will deliver equally powerful blows on widely varying thicknesses of metal, and no change is necessary except for very unusually heavy or special work. This box holds two arms provided with hardened steel rolls at their lower extremities, which run in a circular concave track and which serve to lift the ram, which is entirely independent of the machine by any other connection, thus doing away with all jar or vibration and effectually preventing crystallization of any of the parts.

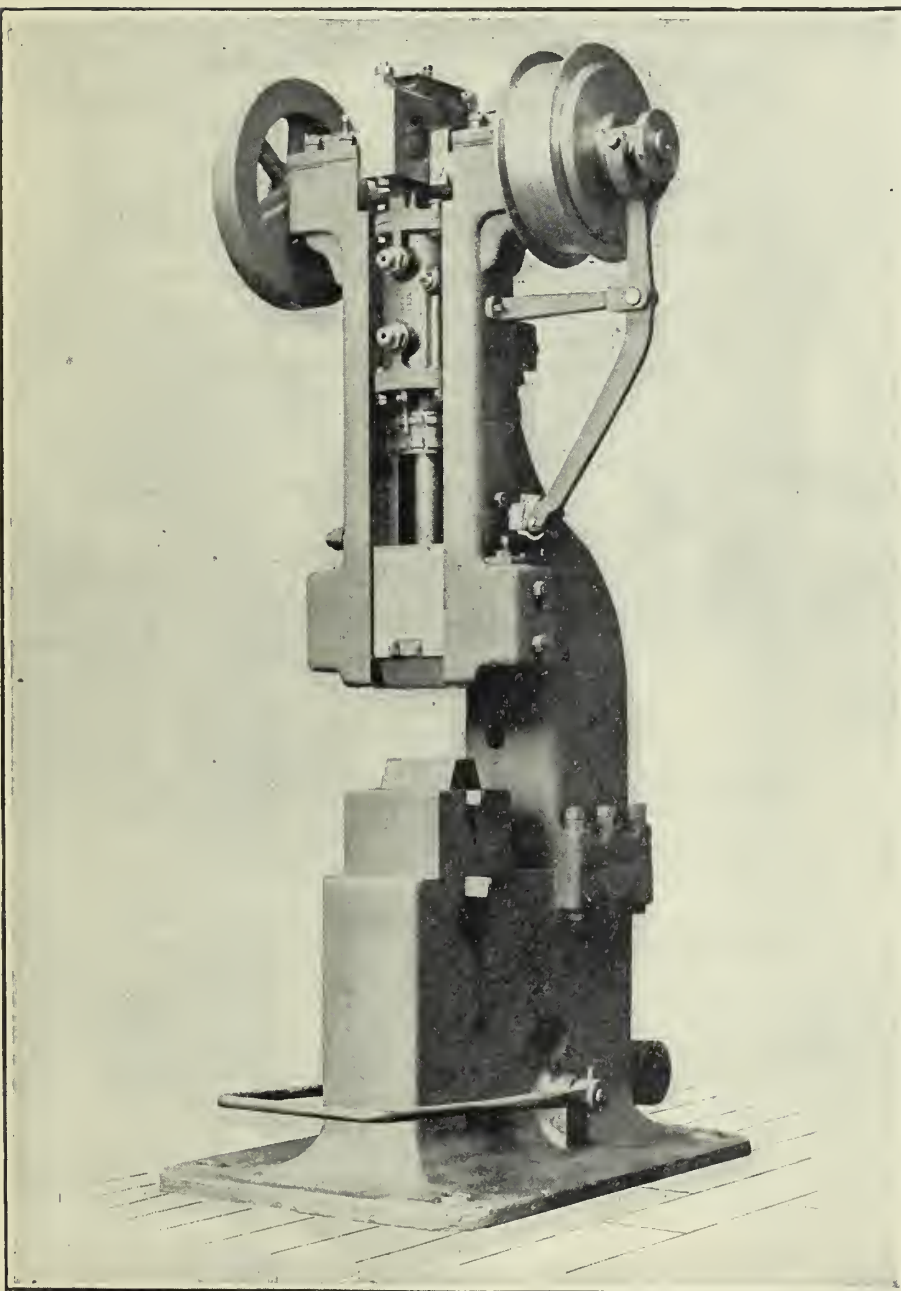


The peculiar construction of this circular concave track, combined with the action of the spring arms and rolls, imparts an elasticity to the ram which no other hammer secures through the medium of the various kinds of springs used, spiral, elliptic or rubber. The ram is counterbalanced in the pulley to raise it to its highest position when stopped. The anvil sets through the frame, but independent of it, six inches below the floor line on its own foundation. The ram, spring arms, rolls and spring box are all made of the best of steel suited for the purpose. The frame is built to secure the greatest amount of strength and solidity, yet occupying but a small area of floor space. The hammer can be made to run at the will of the operator at a high speed, and to deliver a blow from one pound up to its full capacity, which, with the ready adjustability of the machine to receive large or small work, renders it the most economical running hammer ever built.

Built in nine sizes for every class of work. Further information, prices, etc., mailed upon application.

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FIG. 611.



SINGLE STANDARD HACKNEY HAMMER.

A FEW ADVANTAGES.

It occupies less space than other hammers.

It requires much less power to drive.

It strikes a perfectly vertical blow, whether the work be thick or thin, and it is impossible to choke it.

It requires no adjustment in changing from thick to thin work.

The dies always stop apart ready for the insertion of the work.

It is under complete control.

The operator can make it strike with the force of an ounce or the full capacity of the hammer, alternately, as he desires. It is more powerful and yet more easily manipulated than most hammers and requires less repairs.

The hammer is carefully built, all working parts being interchangeable, supplied with wrought steel die holders, and is a powerful and durable tool of its kind on the market.

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General Description Figs. 505 and 507.

THE description follows, and the specification of the different styles and sizes, shown on pages 505 and 507. The operating crank shaft runs in large bearings at the top of the frame, having at one end a driving pulley with friction surfaces, and on the other end a counterbalanced fly wheel. The crank works in a yoke having a sliding box of phosphor bronze, and the yoke is attached directly to an air cylinder, supplied with automatic inlet valves in front and outlet valves in the back, the ports of which are controlled by a wedge operated by a treadle at the base of the frame. The treadle operates simultaneously the brake block, friction clutch and outlet valves. As the treadle is pressed down by the foot of the operator, a vertical reciprocating motion is at once given to the cylinder and head, the speed and force of the blow depending on the extent to which the treadle is pressed down. The cylinder and head stop instantly on withdrawing the pressure from the treadle.

The fly wheel with counterweight insures steady motion and small duty on the belt. At each stroke air is admitted above and below the piston through the inlet valves in the front of the cylinder, so that even with very loose packing in the gland the piston is always suspended between two cushions of air, which prevents all undue jar and concussion.

This combination of air cushions, frictional brake and driving arrangements put the hammer under the absolute control of the operator, and he can change instantly from a heavy blow to a light one, or, by holding the treadle stationary, he can strike any number of successive blows of the same force.

Every precaution is taken to construct the hammer so that it will be not only effective, but durable; and means are provided for taking up all wear where it is liable to occur.

The crank shafts, pistons and heads are all forged of the best open hearth steel, the valves are turned out of solid steel, and all the bearings are large and carefully fitted.

The travel of the cylinder is very short as compared with the travel of the hammer head, so that the power required to run the hammer is reduced to the minimum.

The sizes of the hammers are determined by the weight of the falling parts, viz.: piston rod and head.

All hammers of the double standard style are made with separate anvil blocks, and in all single standards the frame is made in two parts, so that in any case the anvil is easily replaced in case of a break. In any of the sizes a hand lever may be attached, and the hammer operated by hand or foot as desired.

The hammers are all supplied with wrought steel die holders. The working parts are all milled to an exact standard size, and are entirely interchangeable.

TABLE OF PRICES AND DIMENSIONS.

SINGLE STANDARDS.

Sizes.	50 Lbs.	75 Lbs.	100 Lbs.	150 Lbs.
Speed or blows per minute,	350	300	275	240
Distance between dies when at rest,	4 1/2"	4 3/4"	5"	6"
Travel of head,	7"	8"	10"	12"
Length of dies,	5 1/2"	6"	6 1/2"	7"
Size of driving pulley,	14" x 4 1/2"	14" x 4 1/2"	16" x 4 1/2"	16" x 4 1/2"
Total height over all,	6' 8"	7' 0"	7' 3"	7' 10"
Size of bed plate,	3' 4" x 2' 0"	3' 7" x 2' 3"	3' 8" x 2' 6"	4' 2" x 2' 10"
Weight,	2500 pounds	3500 pounds	4000 pounds	5000 pounds
Price on skids F. O. B.,	\$500.00	\$575.00	\$675.00	\$850.00

DOUBLE STANDARDS.

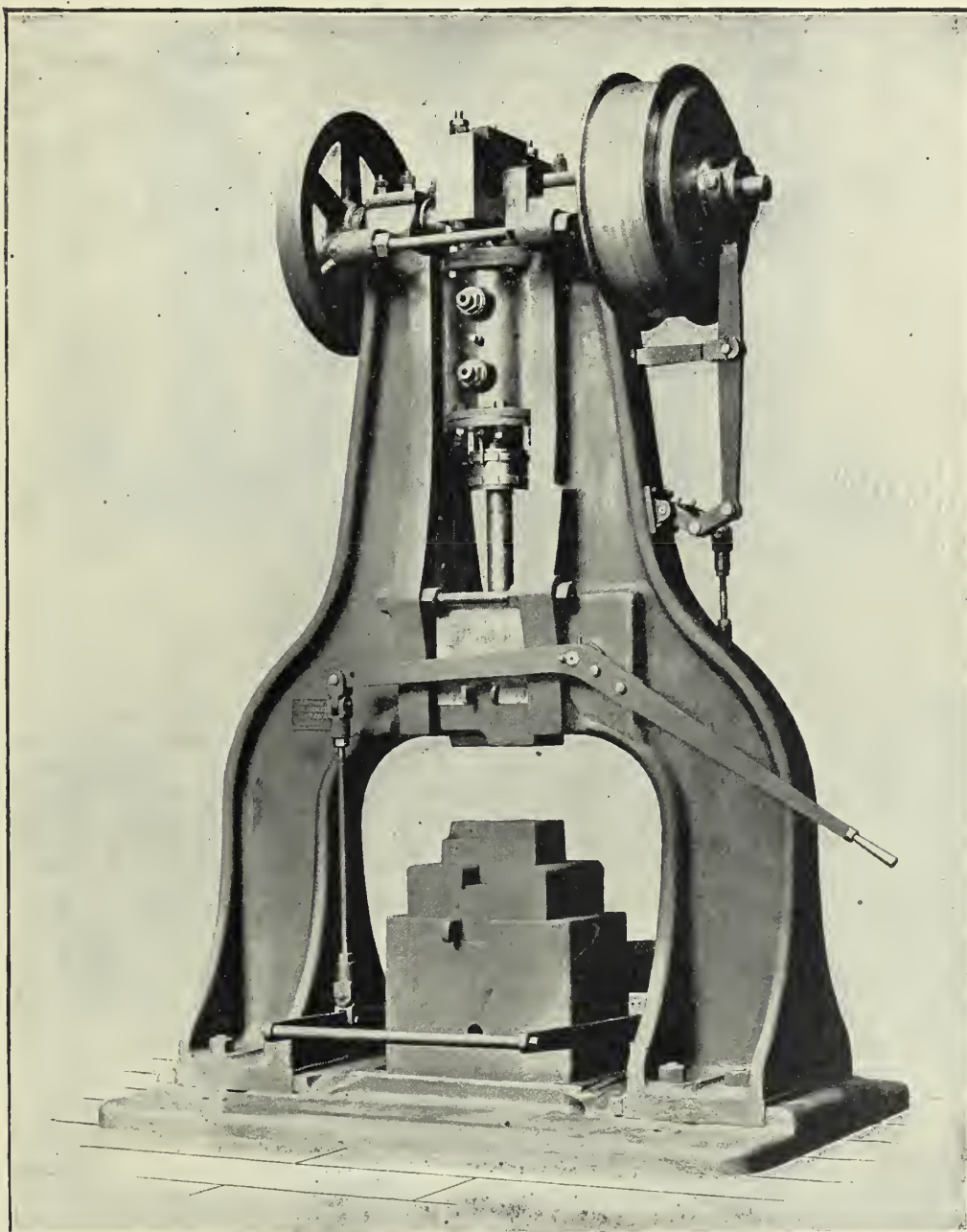
Sizes.	100 Lbs.	150 Lbs.	200 Lbs.	250 Lbs.	300 Lbs.	350 Lbs.	300 Lbs. Long Stroke.	400 Lbs. Long Stroke.	500 Lbs.
Speed or blows per minute,	300	275	225	200	200	200	190	180	200
Distance between dies when at rest,	5"	5"	5"	5"	6 1/2"	6 1/2"	8"	8"	7"
Travel of head,	8"	8"	10"	10"	12"	12"	15"	15"	14"
Length of dies,	8 1/2"	9 1/2"	10"	11"	10"	11"	10 1/2"	11 1/2"	11 1/2"
Size of driving pulley,	16" x 4 1/2"	16" x 4 1/2"	20" x 5 3/4"	20" x 5 3/4"	24" x 6 3/4"	24" x 6 3/4"	26" x 6 3/4"	26" x 6 3/4"	26" x 6 3/4"
Total height over all,	7' 7"	7' 7"	7' 9"	7' 9"	8' 0"	8' 0"	9' 0"	9' 0"	8' 5"
Size of bed plate,	4' 5" x 3' 4"	4' 5" x 3' 4"	5' 6" x 3' 8"	5' 6" x 3' 8"	6' 0" x 4' 0"	6' 0" x 4' 0"	6' 0" x 4' 0"	6' 0" x 4' 0"	6' 6" x 4' 8"
Weight,	6500 lbs.	7000 lbs.	8500 lbs.	9000 lbs.	10000 lbs.	10500 lbs.	11500 lbs.	12000 lbs.	12000 lbs.
Price on skids F. O. B.,	\$750.00	\$940.00	\$1075.00	\$1125.00	\$1250.00	\$1325.00	\$1375.00	\$1500.00	\$1500.00

COMBINATIONS.

Sizes.	250 Lbs.	350 Lbs.
Speed or blows per minute,	200	190
Distance between dies when at rest,	8"	8"
Travel of head,	15"	15"
Length of dies,	10"	11"
Size of driving pulley,	24" x 6 1/4"	26" x 6 1/4"
Total height over all,	9' 0"	9' 0"
Size of bed plate,	5' 5" x 4' 10"	5' 5" x 4' 10"
Weight,	12000 pounds	13000 pounds
Price on skids F. O. B.,	\$1250.00	\$1,450.00

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FIG. 612.



DOUBLE STANDARD HACKNEY HAMMER.

EVERY precaution is taken to construct these hammers, so that they will be not only effective but durable, and means are provided for taking up all wear where it is liable to occur. The crank shafts, pistons and heads are all forged of the best open hearth steel, the valves are turned out of solid steel, and all the bearings are large and carefully fitted. The sizes of the hammer are determined by the weight of the falling parts, viz.: piston rod and head. All hammers of the double standard style are made with separate anvil blocks. In any of the sizes a hand lever may be attached, and the hammer operated by hand or foot, as desired.

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FIG. 613.

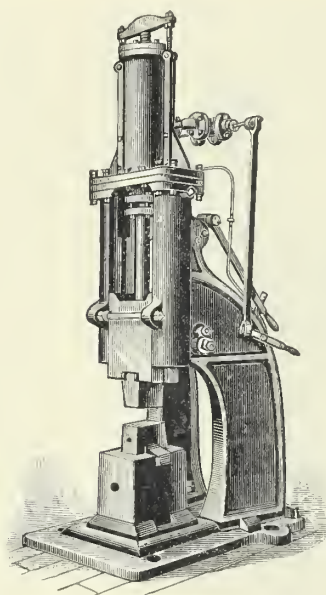
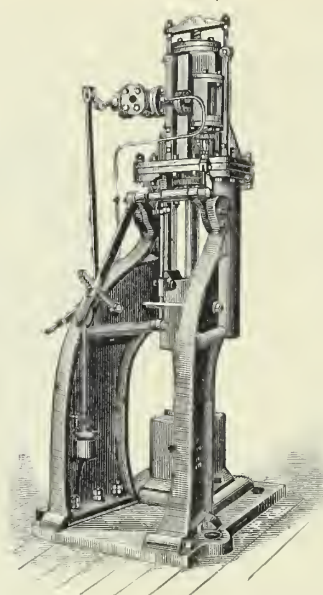


FIG. 614.



OPEN BACK STEAM HAMMER.

THIS HAMMER is fitted with a patent balanced piston valve, controlled by an adjustable slide bar of original design and patent, made moveable, to give greater or less travel to the valve as needed. Some of the advantages of the open back steam hammer are as follows: By the use of the two solid web stands, instead of a single hollow box stand, we get a better braced hammer, besides the stands are of known thickness, and heavily flanged. In the hollow box stands, the thickness of the metal is uncertain, as the shifting of the core in casting makes it thicker on one side and thinner on the other than was intended. The stand is no stronger than the strength of the thinnest place.

By our arrangement of stands we obtain a right-of-way directly behind the anvil block, so that work of any length or thickness within the compass of the hammer can be passed out between the stands.

By the use of the slide bar, an automatic stroke can be obtained of any length up to the full stroke of the hammer. The slide bar can also be set vertical; then the hammer is "handed," or, in other words, each blow is a dead blow, same as if it had no automatic motion. The length of the ram does not determine the length of the automatic stroke; therefore the ram and dies can be made of any width desired. These hammers are made with a treadle when desired.

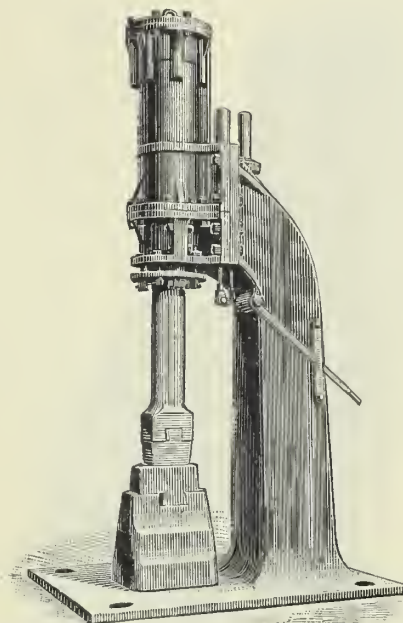
On the top of the cylinder we have a patent stop, which protects the cylinder in case of rod breaking or careless running. All parts where there is much wear are brass bushed. Every part of the hammer has been a matter of study to make it last as long as possible, and when repair is necessary, is easy to reach.

DESCRIPTION.

Size.	Face, Sizes of Dies Ordinarily Furnished.	Distance from Face of Lower Die to Guides.	Diameter of Cylinder.	Stroke.	Weight.
250 pounds	3 x 5½ inches	8 inches	5 inches	14 inches	4000 pounds
400 pounds	3¼ x 7 inches	9½ inches	6 inches	16 inches	6500 pounds
600 pounds	3½ x 7 inches	13 inches	7 inches	20 inches	10000 pounds
800 pounds	5 x 10 inches	12 inches	8 inches	23 inches	13000 pounds
1100 pounds	6 x 9 inches	13 inches	9 inches	26 inches	17000 pounds
1250 pounds	6 x 9 inches	13 inches	10 inches	28 inches	19000 pounds
1500 pounds	6 x 12 inches	19 inches	12 inches	30 inches	28000 pounds
2000 pounds	6 x 12 inches	19 inches	13 inches	33 inches	33000 pounds
2500 pounds	8 x 16 inches	20 inches	14 inches	36 inches	40000 pounds

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FIG. 615.



SIX INCH STEAM HAMMER.

THIS illustration shows the Six Inch Steam Hammer. It is very useful in ordinary blacksmithing or for any small work where speed is required. There is nothing in the shape of a steam hammer to surpass it in welding or making steel knives for splitting leather or similar work where quick sharp blows are necessary. It can strike 120 blows per minute, or as much quicker as it can be handled. It is so easily controlled that it can be used to strike up or drop any special pieces adapted to the different sizes.

Distance from column to center of die,	-	-	-	-	-	-	-	14 inches
Weight of 6 inch hammer,	-	-	-	-	-	-	-	5000 pounds
Weight of anvil block,	-	-	-	-	-	-	-	2000 pounds
Weight of ram and die,	-	-	-	-	-	-	-	250 pounds
Length of stroke,	-	-	-	-	-	-	-	20 inches
Total weight,	-	-	-	-	-	-	-	6000 pounds

All anvil blocks are separate from the column or bed plate.

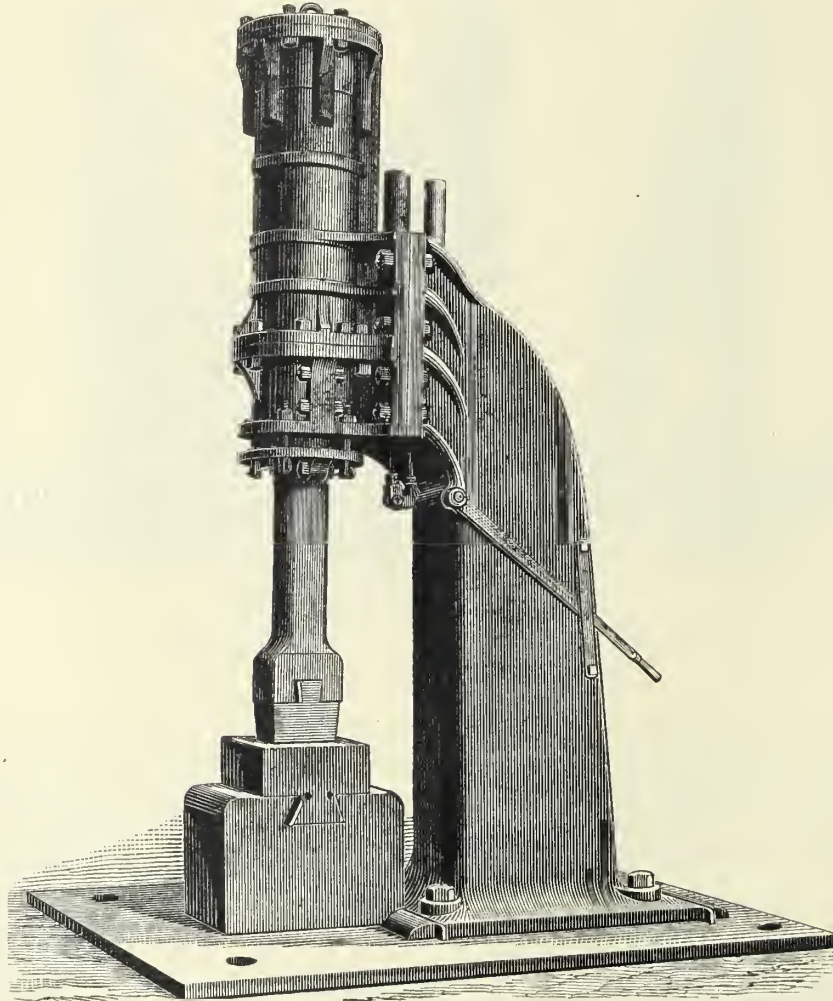
NINE INCH HAMMER.

IT is the same in every respect as the Twelve Inch Hammer shown on following page, only smaller in proportion, and is adapted for lighter work. Distance from column to center of die 16 inches. It is a very useful tool for ordinary blacksmith work and will be found to be very effective on any piece from 8 inches down.

Anvil block,	-	-	-	-	-	-	-	2300 pounds
Ram and die weight,	-	-	-	-	-	-	-	500 pounds
Length of stroke,	-	-	-	-	-	-	-	24 inches
Total weight,	-	-	-	-	-	-	-	8000 pounds

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FIG. 616.



IMPROVED STEAM HAMMER.

THIS illustration represents the standard Twelve Inch Steam Hammer. It takes steam both ways and has an extreme stroke of 28 inches as shown, with steel die keyed in; the piston and ram is in one forging. The valves are perfectly balanced, very sensitive and easily controlled. The piston is cushioned by steam on top to prevent striking the cylinder head and prevent all rebound or kicking.

These hammers present great advantages in their simplicity of construction and the perfection of their proportions. There are three clear sides at which to work, and the center of the die being 22 inches from the column, there is sufficient room for a piece of work of any shape to be readily handled. This hammer is capable of doing work from 12 inches diameter down. It is especially adapted for locomotive or general forging. The dies we furnish are steel and can readily be changed for any form of die for striking or dropping, or adapted to any special work. Foundation drawings furnished.

The total weight of the 12-inch hammer is	-	-	-	-	-	17000 pounds
Weight in anvil block and bottom die,	-	-	-	-	-	5300 pounds
Weight piston and ram,	-	-	-	-	-	1000 pounds
Length of stroke,	-	-	-	-	-	28 inches

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FIG. 617.

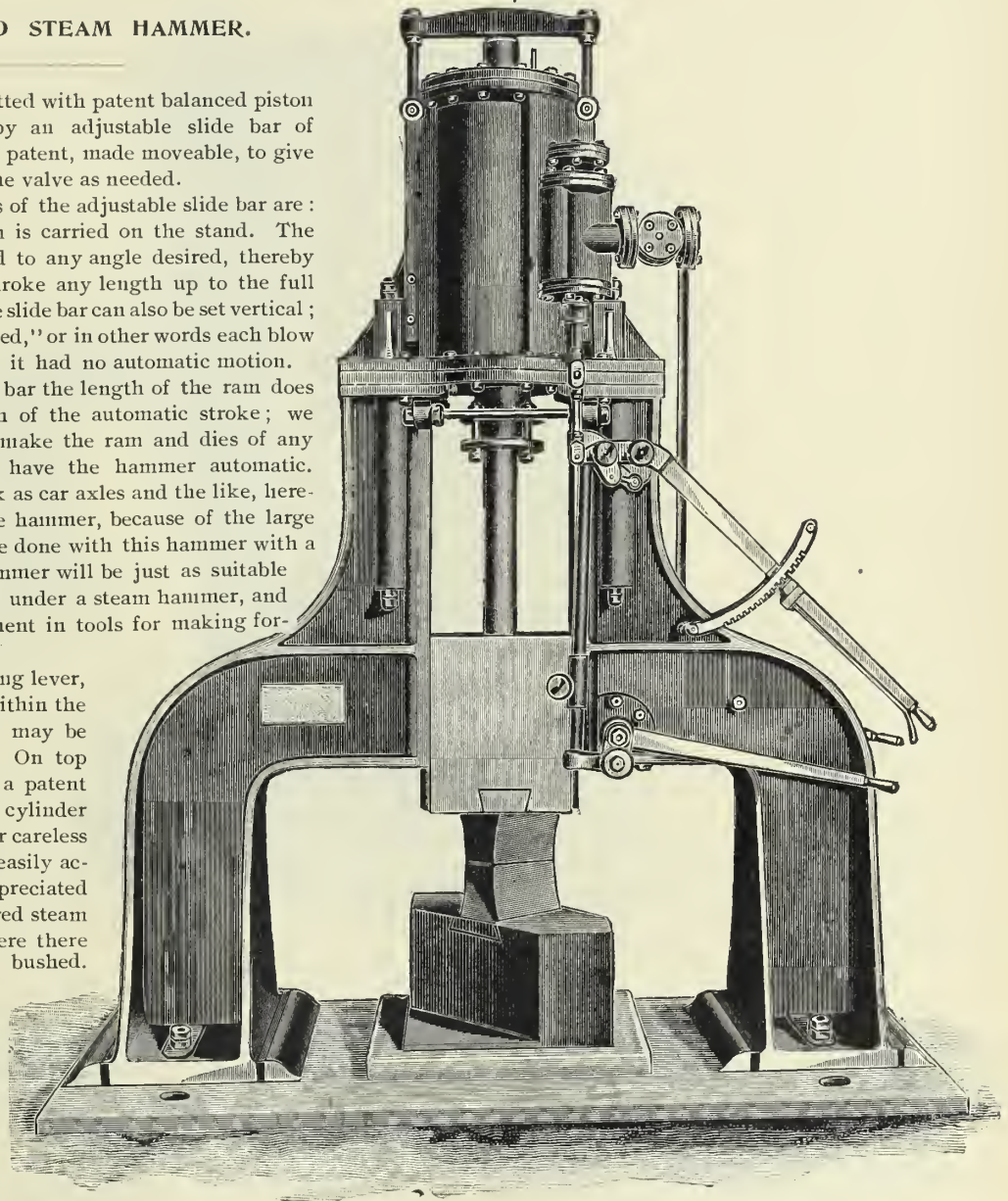
DOUBLE STAND STEAM HAMMER.

THIS HAMMER is fitted with patent balanced piston valve, controlled by an adjustable slide bar of original design and patent, made moveable, to give greater or less travel to the valve as needed.

Some of the advantages of the adjustable slide bar are : The weight of the motion is carried on the stand. The slide bar can be adjusted to any angle desired, thereby making the automatic stroke any length up to the full length of the stroke. The slide bar can also be set vertical ; then the hammer is "handed," or in other words each blow is a dead blow, same as if it had no automatic motion.

By the use of the slide bar the length of the ram does not determine the length of the automatic stroke ; we are therefore enabled to make the ram and dies of any width desired, and still have the hammer automatic. For this reason such work as car axles and the like, heretofore done under a helve hammer, because of the large die space required, can be done with this hammer with a wide ram. The same hammer will be just as suitable for any other work done under a steam hammer, and thus save a large investment in tools for making forgings for various uses.

By the use of the handing lever, a blow of any intensity within the compass of the hammer may be had at will of operator. On top of the cylinder we have a patent stop, which protects the cylinder in case of rod breaking, or careless running. All parts are easily accessible, which will be appreciated by those who have repaired steam hammers. All parts where there is much wear are brass bushed. The stands are solid web, heavily flanged, which form is much more certain of proper strength than the hollow box stand. Every part of the hammer has been a matter of study to make it last as long as possible, and when repair is necessary, is easy to reach.

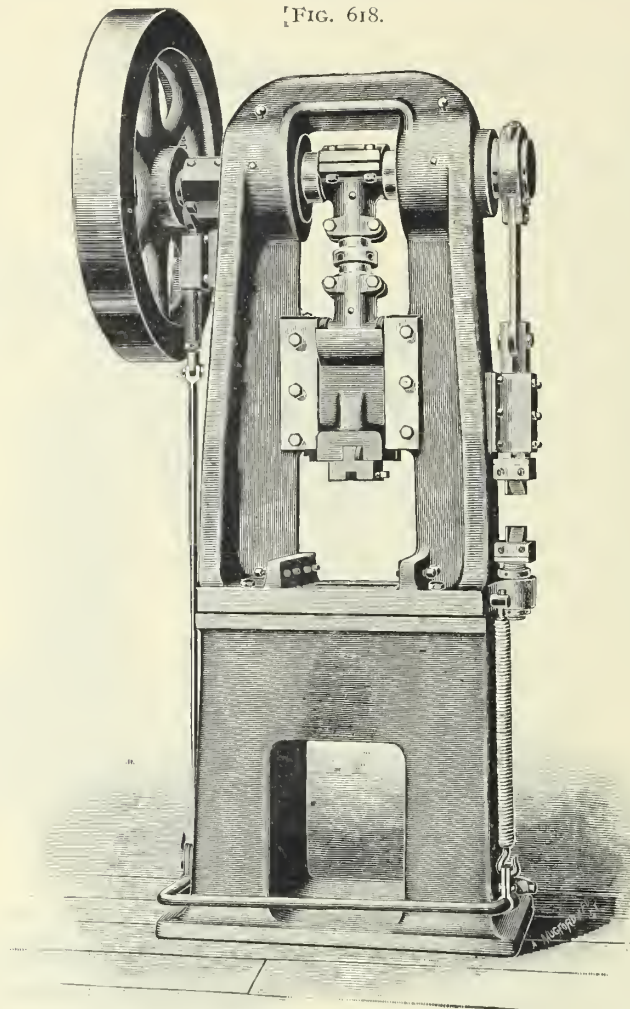


SPECIFICATIONS.

Size.	Face Sizes of Dies Ordinarily Furnished.	Distance from Face of Lower Die to Guides.	Usual Width Between Stands.	Diameter of Cylinder.	Stroke.	Weight.
1100 pounds	5 x 11 inches	8 or 11 inches	4 feet 2 inches	10 inches	21 inches	20000 pounds
1500 pounds	5 x 11 inches	11 or 14 inches	4 feet 6 inches	11 inches	26 inches	27000 pounds
2000 pounds	6 x 13 inches	16 inches	5 feet 2 inches	13 inches	30 inches	38000 pounds
3000 pounds	6½ x 14 inches	19 or 24 inches	6 feet 0 inches	14 inches	33 inches	46000 pounds
5000 pounds	10 x 13 inches	21 or 27 inches	7 feet 0 inches	18 inches	48 inches	66000 pounds

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FIG. 618.



TRIMMING PRESSES.

THESE Trimming Presses are designed to meet the requirements of a general line of drop forging. They are very heavy and strong. A special feature is the side attachment, shown in cut, for cutting the forgings from the bar. These cutters are adjustable to allow for grinding.

The adjustment of the plunger is accomplished by means of a right and left screw and nut. The nut covers the screw, thus keeping out dirt and dust and protecting the screw from bruises.

No. 1 TRIMMING PRESS.

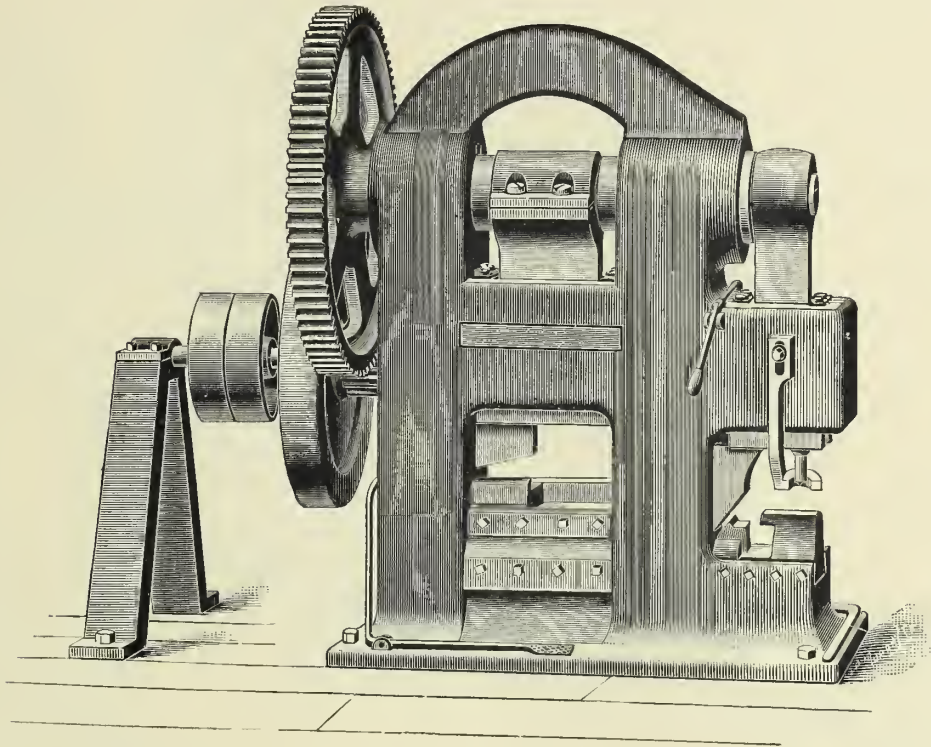
Distance between uprights,	- - - - -	11 inches
Stroke,	- - - - -	3 inches
Adjustment,	- - - - -	3 inches
Diameter of fly wheel,	- - - - -	33 inches
Width of belt,	- - - - -	4 inches
Speed of countershaft,	- - - - -	190 revolutions
Weight,	- - - - -	3000 pounds
Furnished with countershaft.		
Price,	- - - - -	\$

No. 2 TRIMMING PRESS.

Distance between uprights,	- - - - -	17 inches
Stroke,	- - - - -	3 inches
Adjustment,	- - - - -	5 inches
Diameter of fly wheel,	- - - - -	40 inches
Width of belt,	- - - - -	5 inches
Speed of countershaft,	- - - - -	175 revolutions
Weight,	- - - - -	4800 pounds
Furnished with countershaft.		
Price,	- - - - -	\$

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FIG. 619.



No. 6 DUPLEX FORGING PRESS.

THESE PRESSES are adapted to making machine and drop forgings. As from six to twelve sets of dies can be placed in the Press at one time, it saves the large amount of time required to change dies which is unavoidable when the work is done on a drop hammer.

The dies can be made of cast iron, for it does not destroy them as a drop hammer does, giving a steady pressure instead of a jar or blow.

We would call your attention to the following manifest advantages, many of which are possessed by no other machine now on the market :

The Duplex Press consists of two plungers on one crank shaft, so connected that either plunger may be worked independently, or they may be run together, or either may be used as shears, or press, or punch, while the other is in use for the same or other purposes.

Through its whole stroke the plunger is under the perfect control of the operator. By a simple device the plungers can be lowered to meet the dies, or to any other point of the stroke, while the shaft is running, and thus the punch may be brought exactly to a prick point or scratch mark.

The operator controls the plungers through a treadle, thus leaving his hands free to feed the machine.

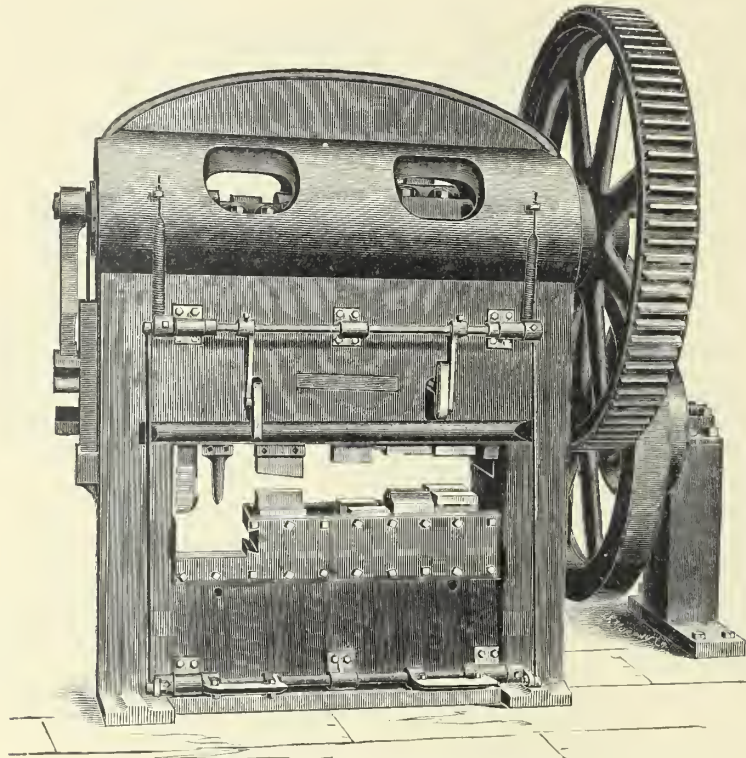
The shears can be put in either way, so that large plates can be cut.

The amount of power required is very small.

It takes up less floor room than any press doing the same amount of work, combining press, shears and punch.

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FIG. 620.



No. 7 DUPLEX FORGING PRESS.

THE demand for a Duplex Forging Press for heavy forging has become so great that we have just brought out a special machine for this kind of work. In common with the smaller presses built, it consists of two plungers on one crank shaft, so constructed that they may be run independently or together. By a patented "step clutch," the throw of the plungers can be varied at the will of the operator, being made long or short by simply pressing, more or less, upon a conveniently placed treadle, in all cases the movement of the plungers being equally positive.

This perfect control of the plungers, by means of the treadle, leaves the operator's hands free to attend to other important details.

All presses are pre-eminently simple and free from liability to get out of order, requiring no special training to operate successfully.

As shown by the cut, the new press for heavy forging is built in a thoroughly substantial manner, no pains having been spared to make every part of ample size and strength; and its solid rectangular "housings," of great weight and strength, adapt it to the severe work of forging anvil tops, turn buckles, shackles, stone hammers, sledges, draw-bar heads, pick-eyes, axe polls, eye bolts, etc., in fact, all kinds of general forging, also for bending, cutting and punching structural iron of all kinds, such as railroad and angle iron, house hangers, heavy beams, etc.

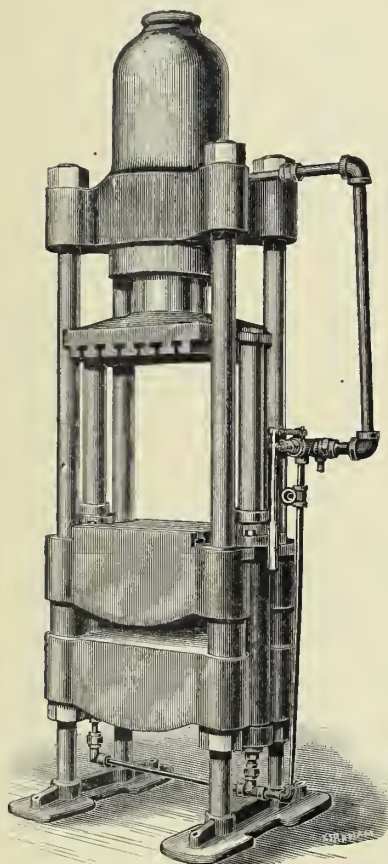
Bridge builders and architectural iron workers will find it a most useful machine in their work.

SPECIFICATIONS.

No.	Stroke.	Cut Round.	Cut Flat.	Will Punch.	Throat Space.	Diameter of Pulley and Face.	Speed of Fly Wheel.	Weight.	Floor Space.
3	1 inch	$\frac{3}{4}$ inch	2 x $\frac{1}{2}$ inch	$\frac{1}{2}$ x $\frac{1}{2}$ inch	5 inches	12 x $3\frac{1}{2}$ inches	350 revolutions	1500 pounds	30 x 30 inches
4	1 $\frac{1}{2}$ inches	1 $\frac{1}{4}$ inches	4 x $\frac{3}{4}$ inch	$\frac{3}{4}$ x $\frac{5}{8}$ inch	7 inches	16 x 4 inches	300 revolutions	4500 pounds	33 x 33 inches
5	2 inches	1 $\frac{1}{2}$ inches	5 x $\frac{7}{8}$ inch	1 x $\frac{3}{4}$ inch	9 inches	18 x 4 $\frac{1}{2}$ inches	280 revolutions	6400 pounds	36 x 36 inches
6	2 $\frac{1}{4}$ to 3 inches	2 $\frac{1}{2}$ inches	9 x 1 inch	1 $\frac{1}{4}$ x 1 $\frac{1}{8}$ inches	11 inches	22 x 5 $\frac{1}{4}$ inches	250 revolutions	12000 pounds	48 x 48 inches
7	2 $\frac{1}{2}$ to 3 $\frac{1}{4}$ inches	3 inches	10 x 1 $\frac{1}{4}$ inches	2 $\frac{1}{2}$ x 1 inch	26 inches	30 x 6 $\frac{1}{4}$ inches	200 revolutions	20000 pounds	84 x 48 inches
8	4 $\frac{1}{2}$ inches	3 $\frac{1}{2}$ inches	24 x 1 $\frac{1}{2}$ inches	8 x 1 $\frac{1}{4}$ inches	53 $\frac{1}{2}$ inches	30 x 8 inches	190 revolutions	30000 pounds	96 x 48 inches

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FIG. 621



REVERSED CYLINDER COMBINED FORGING AND DRAWING PRESS.

THE moving platen of this press, which is cast as a part of the arm, has T slots for bolting dies to it, and is guided from turning by the rods, while the upper of the two similar platens has T slots at right angles to those on the moving platen, so that two dies may be brought into exact alignment. The cylinders are a strong extra quality of steel, wrought iron rods and cast iron platens. Two small cylinders between the rods serve to separate the dies and raise the ram very quickly. The lower platen has a plain surface on which a drawing die may be placed, hole 4 inches in diameter being cast through both platens to allow blank to be placed in the press and forced through die and lower platen. A single balance piston valve governs all motions of the press.

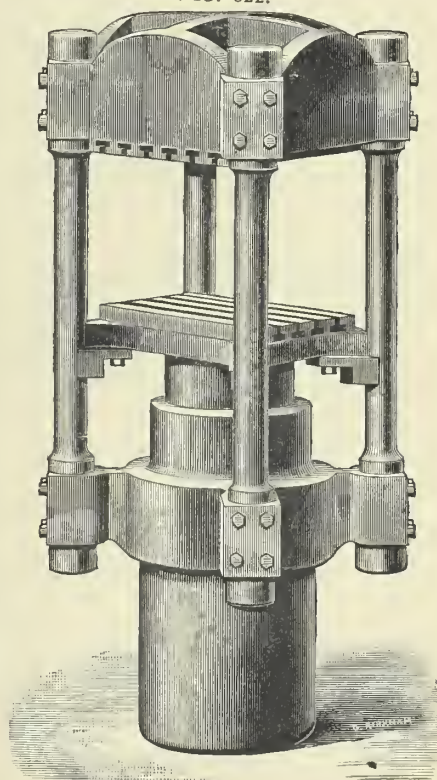
Ram,	-	-	-	-	-	-	10½ inches
Platens,	-	-	-	-	-	-	16 x 22 inches
Power,	-	-	-	-	-	-	150 tons
Motion,	-	-	-	-	-	-	18 inches
Opening,	-	-	-	-	-	-	24 inches
Weight,	-	-	-	-	-	-	4500 pounds

HYDRAULIC FORGING PRESS.

THIS is a special form of one of our Reinforced Steam Cylinder Presses, in which the faces of the upper and moving platens have T slots for attaching the dies in which the work is to be pressed, the slots in the two platens being at right angles to each other, so that the dies may be properly adjusted. As this press has to work from an accumulator, and very quickly, the pipe opening is comparatively large, being 1½ inches in diameter, and the action of the press is governed by one of our 2 inch balanced piston valves, the low pressure valve and check valve are introduced in the piping for the filling of the press by a light pressure accumulator, worked under a pressure of 150 pounds per square inch, while the one that gives the full pressure has a pressure in the neighborhood of 2000 pounds per square inch. The ram of the press is 20 inches in diameter, giving a pressure of about 300 tons. The platens are 24 x 26 inches, with a motion of 18 inches, and opening of 20 inches. Any other sizes desired can be furnished.

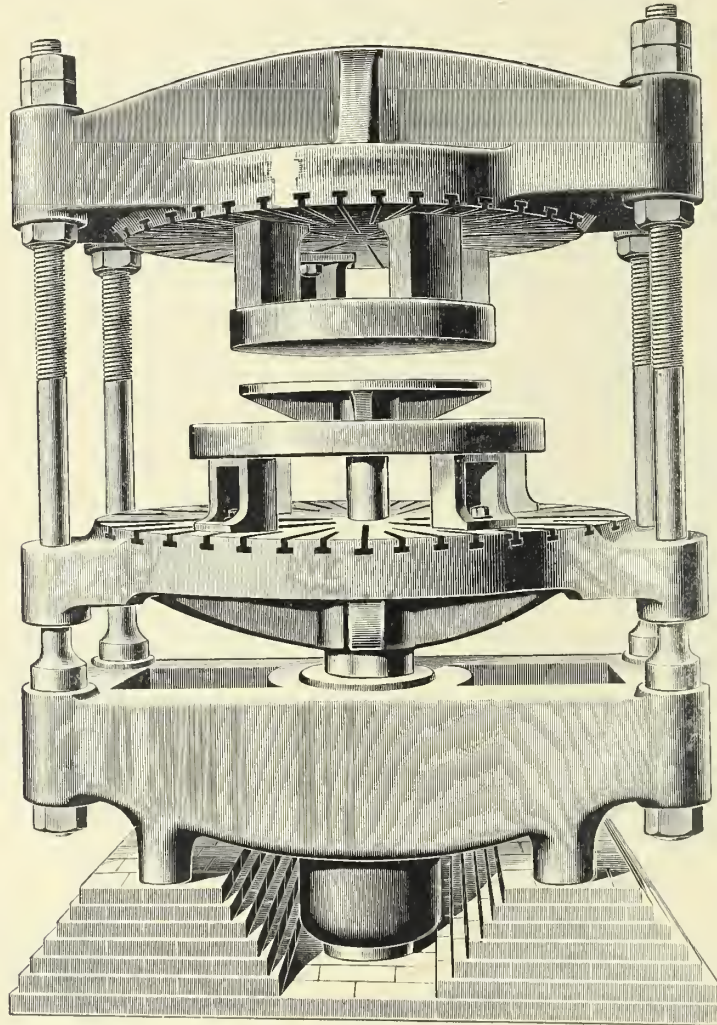
Weight,	-	-	-	-	-	-	13000 pounds
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FIG. 622.



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FIG. 623.



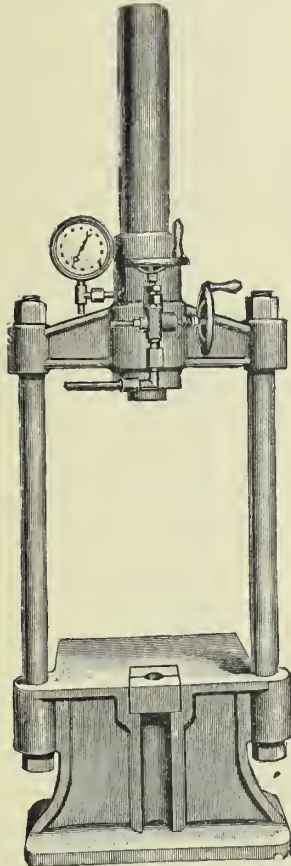
HYDRAULIC FLANGING AND FORGING PRESS.

THIS tool has a round T-slotted table 4 feet in diameter, a 12 inch ram with a motion of 3 feet, and an interior ram 4 inches in diameter and 2 feet motion. The rods are 5 feet $3\frac{1}{4}$ inches between centers, and are turned $3\frac{1}{4}$ inches with square thread upon them for adjusting the position of top plates. The T slots are adapted for $\frac{3}{4}$ inch T head bolts. The small ram is connected to the valves by a system of swivel joints, which are very much better than the old type of a coil of copper piping. The valves are our balanced spindle type of $1\frac{1}{4}$ inch and $\frac{3}{4}$ inch sizes. By the substitution of dies or bending blocks many forms of work can be made. The opening is adjustable from 60 to 30 inches. Platen is 4 x 5 feet power 100 tons.

This press weighs approximately 18000 pounds.

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FIG. 624.



PLAIN HYDRAULIC BROACHING PRESS.

(Description Fig. No. 624.)

THIS PRESS was first designed for the fitting of the spindles in tail stocks of lathes. The ram is forced downward, the return being either by spring or hydraulic cylinder, according to circumstances.

The table has a front opening four inches wide, over which blocks are placed for giving a support to the collar entirely around the shaft or spindle, and also insuring a central strain on the rods.

Distance between rods is 25 inches; the table being 24 x 25 inches; the opening, 30 inches; ram, 5 inches; travel, 12 inches.

It will give a pressure of 60 tons, and is driven by an accumulator system or independent belt pump.

Price, with two-plunger automatic variable delivery belt pump, - - \$500.00

Price, with single plunger belt pump, - - - - - 425.00

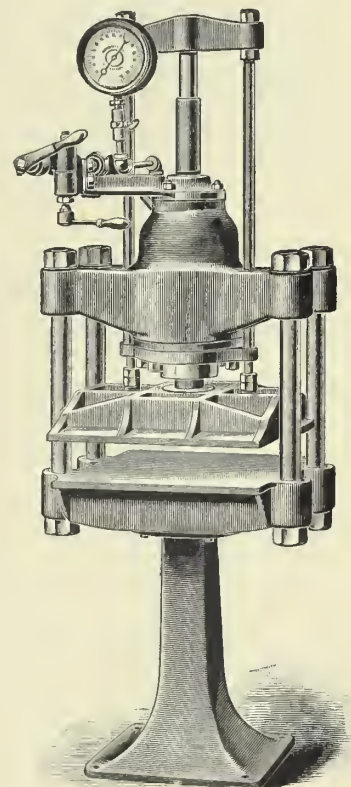
SINGLE CYLINDER PRESS.

(Description Fig. No. 625.)

THIS is the type of smallest of the leather belt presses, the cut representing the 20 inch size, with valving as arranged for an accumulator governed plant. The main pressing cylinder is downward acting, with an automatic reverse cylinder mounted on top of it. The packings are easy of access, being located under glands, and can be taken out and renewed without taking the press apart. By using the lower of the two valve handles any desired pressure up to the maximum can be put upon the work. The gauge is marked to read as desired, in tons or in inches of belt, the standard pressure on belt being about 200 pounds to the square inch. This press stands upon one of our press stands of good broad foundation, making a steady and compact base. The 20 inch press is 22 inches between the rods and 24 inches in line of belt.

Weight, about	-	-	-	-	-	1400 pounds
Price,	-	-	-	-	-	\$260.00

FIG. 625.



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FIG. 626.

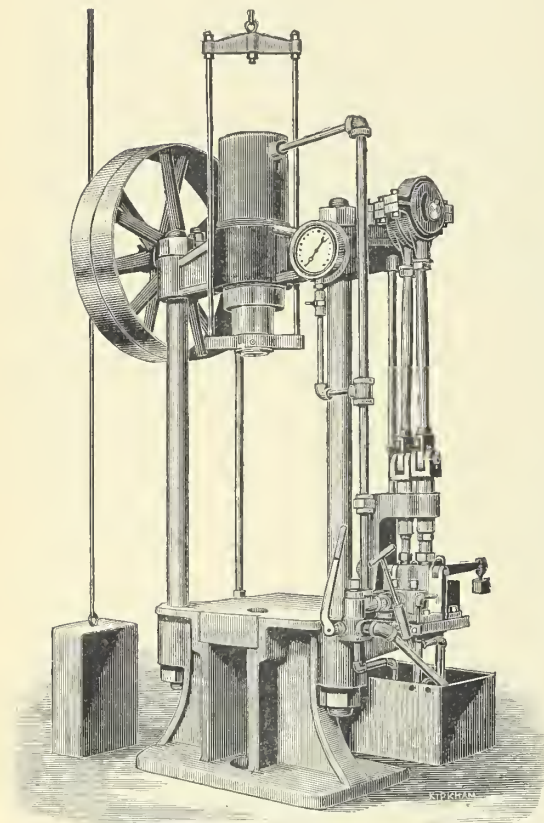
HYDRAULIC BROACHING PRESS,

WITH VARIABLE DELIVERY PUMP ATTACHED.

(Description Fig. No. 626.)

THIS PRESS is similar in design to our Plain 60 Ton Press with a variable delivery belt pump attached, the shaft and eccentrics being placed at the top of the press and one side of the cylinder; the pumps upon the ledge at the side of the lower platen. The main tension rods are $3\frac{7}{8}$ inches in diameter, placed in line with the center of the ram. In the bed a square block is inserted, which is bored to suit the size shaft on which work is to be done, so that the resistance may come close to the shaft and not create any bending action upon the work, and cramping the shaft as it is forced into the hole. The opening in the bed beneath the block is carried through the base, so that in case it is desired to force long shafts out, it may be done, provided a hole is made in the floor underneath. A small handle, which is convenient, shuts off the action of the large pump, and a small lever, operating an improved form of release valve, releases the pressure from the ram, allowing it to be drawn back. In case there is any great variety of work a special block is made, which can be easily attached to the ram proper, and this when placed in the press, shortens the clear space available. As the strain of driving the pump lies outside of the main tension rods, small ones are placed outside of the bearings of the shaft. One-third of the base lies in front of the center line of the main bolts in the 100 ton size, instead of all back,

FIG. 627.



as is shown in our 60 ton form. One of our safety couplings protects the gauge from injury by the sudden releasing of the pressure.

Ram.	Power.	Motion.	Table.	Opening.	Jaw.	Price.
5 inches	60 tons	12 inches	24 x 25 inches	30 inches	7 inches	\$550
7½ inches	100 tons	18 inches	36 x 38 inches	48 inches	7 inches	700
9 inches	150 tons	18 inches	36 x 38 inches	48 inches	7 inches	825

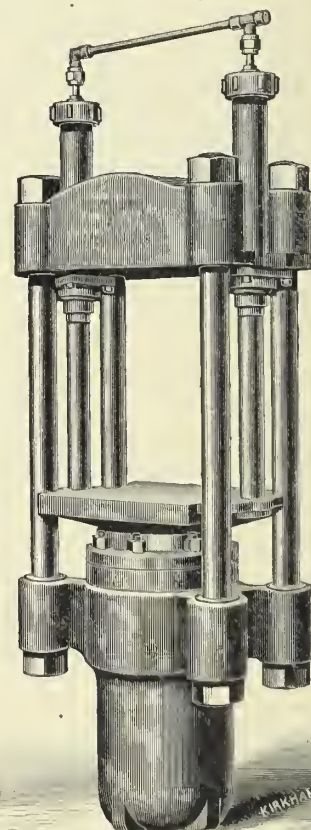
REINFORCED CYLINDER PRESS,

WITH AUTOMATIC REVERSE ACTION CYLINDERS.

(Description Fig. No. 627.)

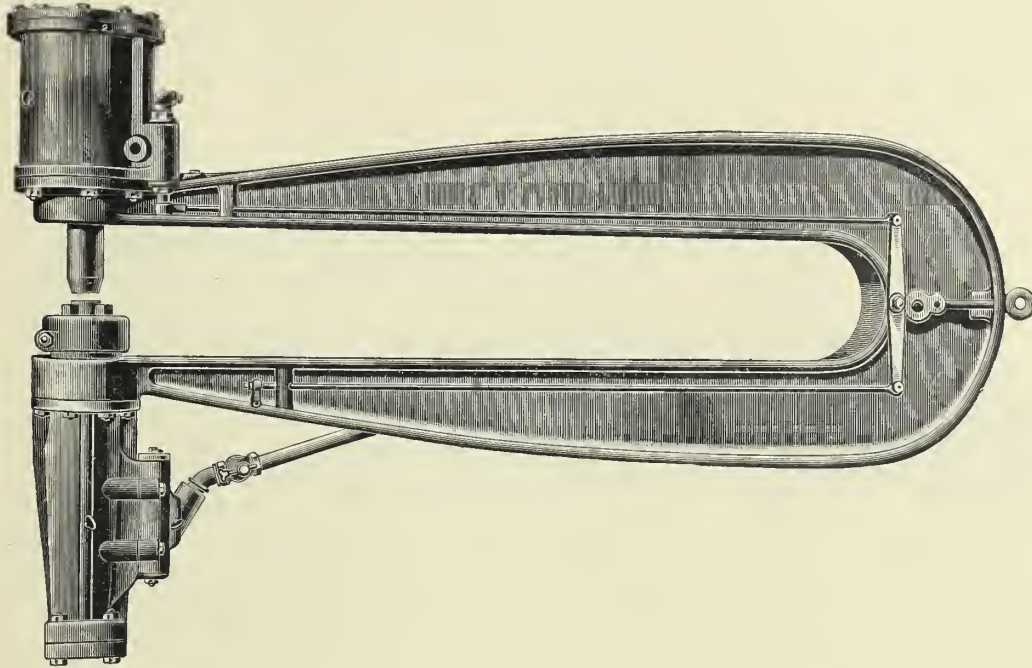
THE PRESS from which this cut is made is one of a lot used in electrical work. The beam acting strain on the cylinder is taken up by reinforcement of the body of the cylinder and not by a separate yoke. On account of the motion being too great to allow the ram to be taken out for repacking the cylinder, without taking down the press, the packing is placed underneath a gland. Small downward acting automatic cylinders, of 12 tons power, are placed on each side of the press and force the ram back very quickly and steadily, also to part the dies which may be in the press, if they should stick together. This cylinder and ram attachment may be placed on any of our presses if desired.

Ram.	Power.	Movement.	Platen.	Opening.	Weight.	Price.
10 inches	150 revolutions	18 inches	16 x 22 inches	24 inches	3150 pounds	\$550
12 inches	250 revolutions	24 inches	20 x 24 inches	72 inches	6300 pounds	750



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FIG. 628.



PORTABLE PNEUMATIC RIVETING MACHINE.

THE RIVETING MACHINE proper consists of a cylinder, with the hammer head or die attached to the end of the piston rod, capable of being easily changed to adopt the machine for different sizes of rivets and heads. The valve is operated directly by the pressure in the cylinder without extra gearing, and so arranged that the length of the stroke regulates itself automatically to correspond with the gradual reduction of the end of the rivet as the head is formed. The machine is operated with an atmospheric pressure of from 25 to 30 pounds to the square inch, and makes from 150 to 200 strokes per minute. The time required to form the head of a $\frac{3}{4}$ inch rivet is about six seconds, and at steady, straight work, allowing for ordinary detention and loss of time, two or three rivets can readily be finished in one minute.

The machine may be suspended from a bar arranged overhead, to allow a longitudinal motion to the riveter when operating on straight seams, but we advise fitting up a traveling carriage, capable of a longitudinal and side motion, whereby, if operating against the side of the boiler shell, as shown in Fig. 627 (which will be found the most convenient way of operating the machine), the machine can easily be regulated for any diameter of shell. The riveter being supported in a turning ring is equally applicable to operate on the top, or at any angle to the shell. The operation with the machine is as follows:

The rivet boy, after inserting the hot rivet, moves the die and weight over the end head of the rivet, when the operator admits pressure into the cylinder (A) by moving the rod (B), thereby closing the long ends of the bars and bringing the end socket of the riveter upon the plates over the rivet, thereby holding the plates together by a pressure of about 1200 pounds. The operator then presses upon the spring valve (D), thereby admitting the air pressure into the riveter to operate its hammer, and thus forms the rivet head by a succession of rapid blows. It will thus be perceived that only one man is required to operate with this machine, dispensing with one riveter and the man to hold on.

By suspending the machine from a horizontal bar or traveling carriage, it is easily moved from one rivet hole to the next when operating on a horizontal seam. The advantages of this riveting machine are:

First.—The facility of taking the machine to the work to be operated upon, instead of carrying the work to the machine, as is required with all other riveting machines heretofore made.

Second.—The great saving of labor and expense, as by riveting by hand, one holder-on and two riveters are required, while by the use of this machine only one man—who need not be a skilled riveter—will be necessary.

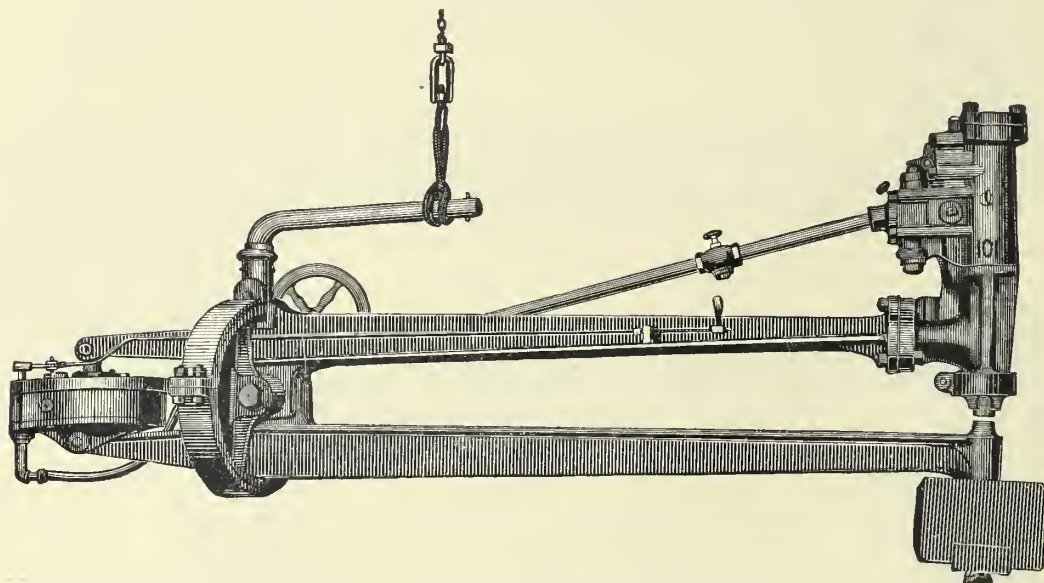
Third.—Rapidity of work. Nearly all boiler makers agree that to drive 35 pounds, or about 250 rivets, is considered a good day's work for one holder-on and two riveters, while by the employment of this machine, one man can drive from 800 to 1000 rivets a day, allowing for all necessary detention.

Fourth.—The machine requires absolutely no preparation of foundation or other accompaniments, and is furnished at a price much below the cost of producing any existing machine.

These boiler riveters have recently been improved by strengthening the arms, making them more rigid, and better adapted for heavy work, besides reducing the working parts of the riveting cylinder, and feel confident that the change will be a great improvement.

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FIG. 629.



PORTABLE RIVETER FOR BOILER AND TANK WORK.

THIS RIVETER has been gradually introduced into some of the principal boiler shops of the United States and Europe. There are at present about 135 machines in practical operation in the United States. It possesses all the feature of hand work, and is capable of driving rivets with as great rapidity as the large and expensive steam or hydraulic riveters now in use.

Fig. 628 represents the riveter detached from the shell.

Fig. 629 represents the riveter as operating on the side of a boiler shell.

One of the chief objects of the inventor has been to produce a perfect machine at a moderate cost, with a view of placing it within the reach of all engaged in the manufacture of boilers or tanks, and to be able to take the machine to the work to be operated upon instead of carrying the work to the machine, as is required in all other boiler riveting machines heretofore made.

The riveter works on the principle of hand work, forming the head of the rivet by a succession of rapid blows around the rivet until the desired shape of the head is obtained.

The machine consists of two levers, having at one end a pressure cylinder to open and close the levers, and at the other end the riveting machine on one arm, and a suitable die with counterweight attached on the other arm.

The long arms of the levers are made 63, 76 and 90 inches from center of joint pin to the center of riveter, capable of reaching a rivet 60, 72 or 84 inches, respectively, from the edge of the plate, so as to operate upon the circular seams of a boiler. The levers are supported in a turning ring operated by a worm wheel, to enable the machine to be placed at any desired angle and position to the boiler shell.

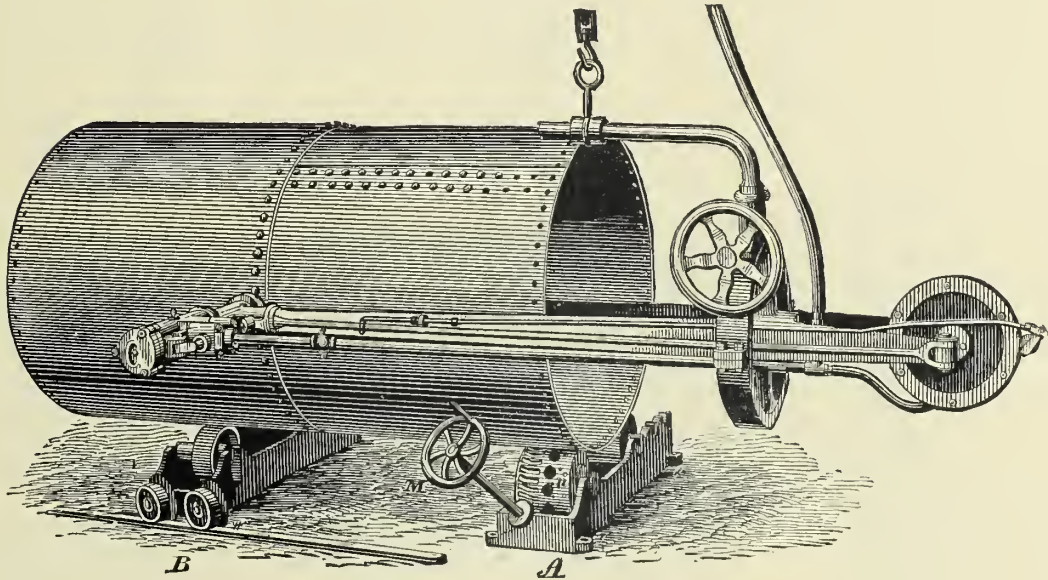
Price of boiler riveter, 5 feet reach, complete,	- - - - -	\$750.00
Weight of riveter, 900 pounds.		

Boiler riveter, reaching 72 inches,	- - - - -	850.00
Weight, 1100 pounds.		

Boiler riveter, 84 inches,	- - - - -	950.00
Weight, 1300 pounds.		

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FIG. 630.



BOILER SADDLE.

WHEN operating on a circular joint, the boiler must be turned so as to bring the rivet in a line with the riveting cylinder. For this purpose Mr. Allen has invented a boiler saddle, whereby the largest boiler, whether out of balance or not, can easily be turned by the operator as may be desired, and firmly held in position without any extra manual labor.

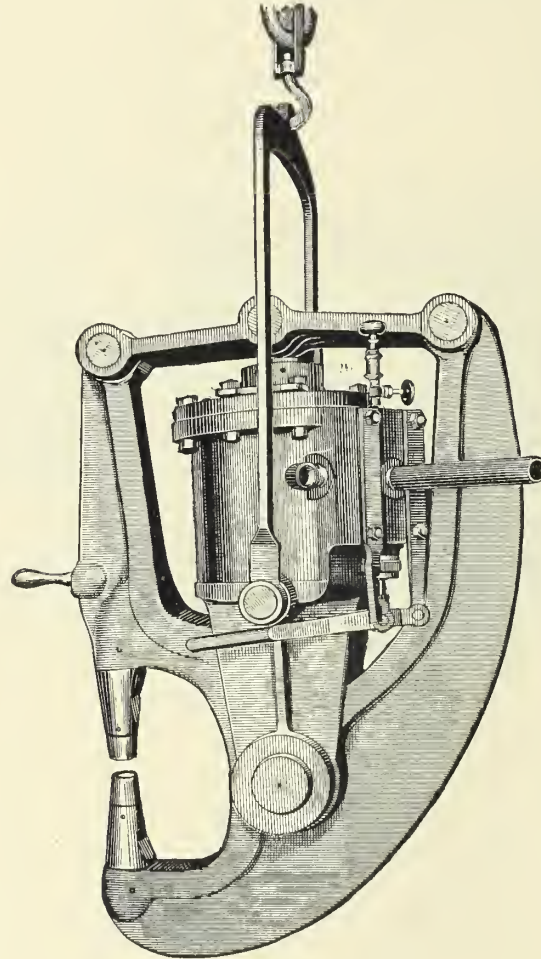
One of the wheels, N, forming the front saddle, A, is provided with projecting pins and with cavities, which engage either with the rivet holes in the edge of the boiler sheet or with the finished rivet heads on the shell, so as to form a kind of gear wheel, whereby the boiler shell, by the turning of this wheel, can be turned around in any desired direction. A worm wheel operated by the handle wheel, M, works into teeth on this wheel, N, for the purpose of turning the same, and at the same time to turn the boiler shell in any position, and hold the same, even if one side of the shell should be heavier than the other side.

The front saddle, A, should be firmly attached to the floor. The after saddle, B, is provided with wheels to run upon suitable rails, so that the boiler shell can easily be moved backward while resting upon the saddle, B, for the purpose of joining an additional course to the front of the shell.

Price of boiler saddles to support and turn boiler shell,	-	-	-	-	\$55.00
Weight,	-	-	-	-	545 pounds

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FIG. 631.—ARM C.



LEVER RIVETERS.

THESE RIVETERS are principally intended for beams and girders for bridge building, and forms the rivet head by compressing the end of the rivet into a suitable die. The levers, turning on a fulcrum, contain at one end the dies, and are connected at the other end to a toggle joint, to the center of which the piston rod of a pressure cylinder is attached. The arms C and D are made interchangeable, so that the machine with arm C, as represented in Fig. 631, will straddle the edge of girders or beams having 6 inch angle irons on each side, and when arranged with lever D, as represented in Fig. 632, plates may be riveted on to 5 inch channel iron.

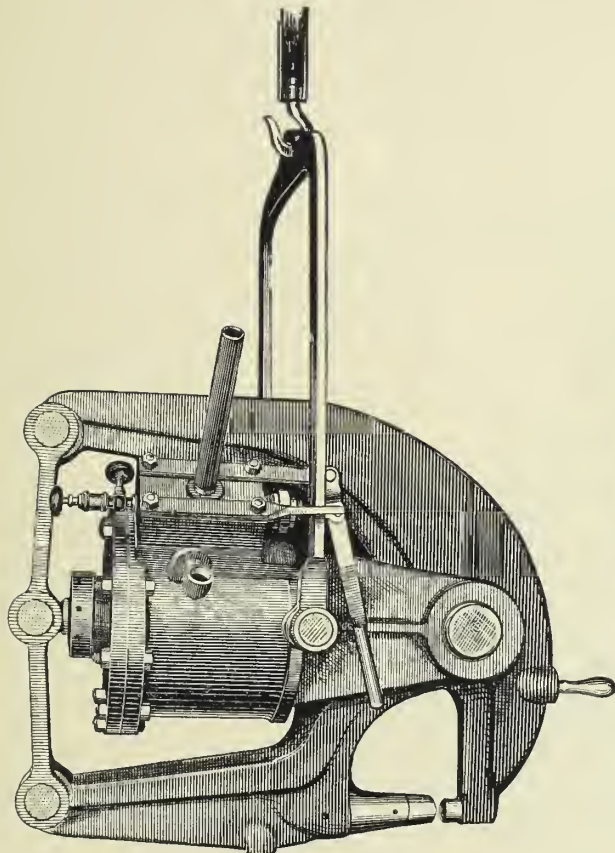
The pressure used in this machine is from 60 to 75 pounds, and the arms are made of sufficient strength to operate on 1 inch rivets. The weight of the machine complete is about 860 to 925 pounds, according to size. The same is operated by air, for the convenience of handling the machine.

In consequence of the peculiar construction and arrangement of the elbow or toggle joint, between the power employed for operating the machine and the hinged or pivoted arms which carry the dies, a small 10 inch cylinder will produce, at the end of the stroke or when the dies are nearly closed, a pressure upon the rivet of about 50 tons.

Riveter with 10 inch cylinder,	- - - - -	Weight, 860 pounds	Price, \$750.00
Riveter with 11½ inch cylinder,	- - - - -	Weight, 925 pounds	Price, 850.00

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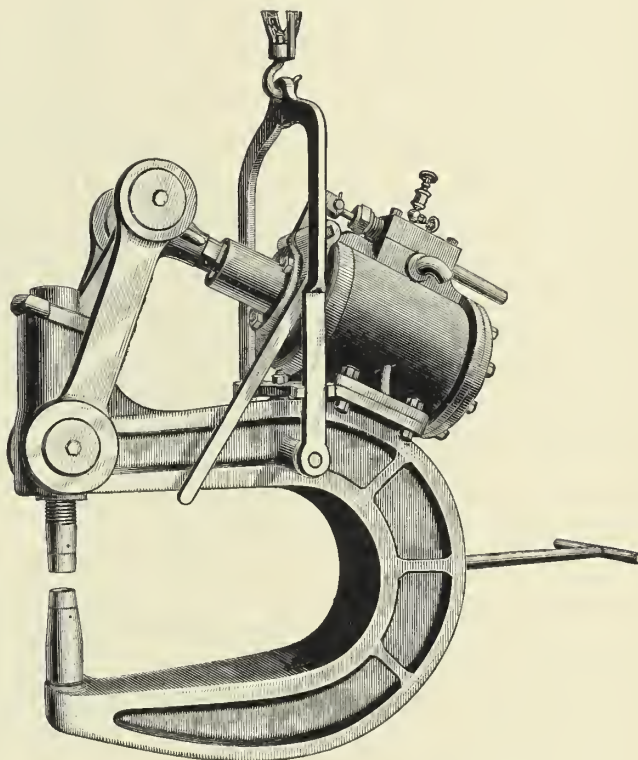
FIG. 632.—ARM D



COMPRESSION RIVETER.

FOR CHANNEL-IRON BRIDGE WORK.

FIG. 633.



JAW RIVETER.

FOR BRIDGE WORK.

THESE RIVETERS are applicable for all descriptions of bridge work, similar to the Riveter represented in Fig. 631, and will straddle the edge of girders and beams having 6 inch angle-irons on each side, and likewise operate in 5 inch channel-iron without change, except the dies.

These machines may be operated by steam at a pressure of from 60 to 70 pounds, but we advise the use of atmospheric pressure. The piston rod connects levers of different lengths, forming a toggle-joint. The lower ends of the larger levers are attached to fixed centers on the frame, and the end of the central short lever is attached to the dolly-bar, into the lower end of which the head-die is screwed. By this latter arrangement, any desired change in the distance between the dies is easily effected. The dolly-bar has a stroke of $3\frac{1}{2}$ inches, and is acting in a direct line with the axis of the rivet.

The machines are of sufficient strength to operate on 1 inch rivets.

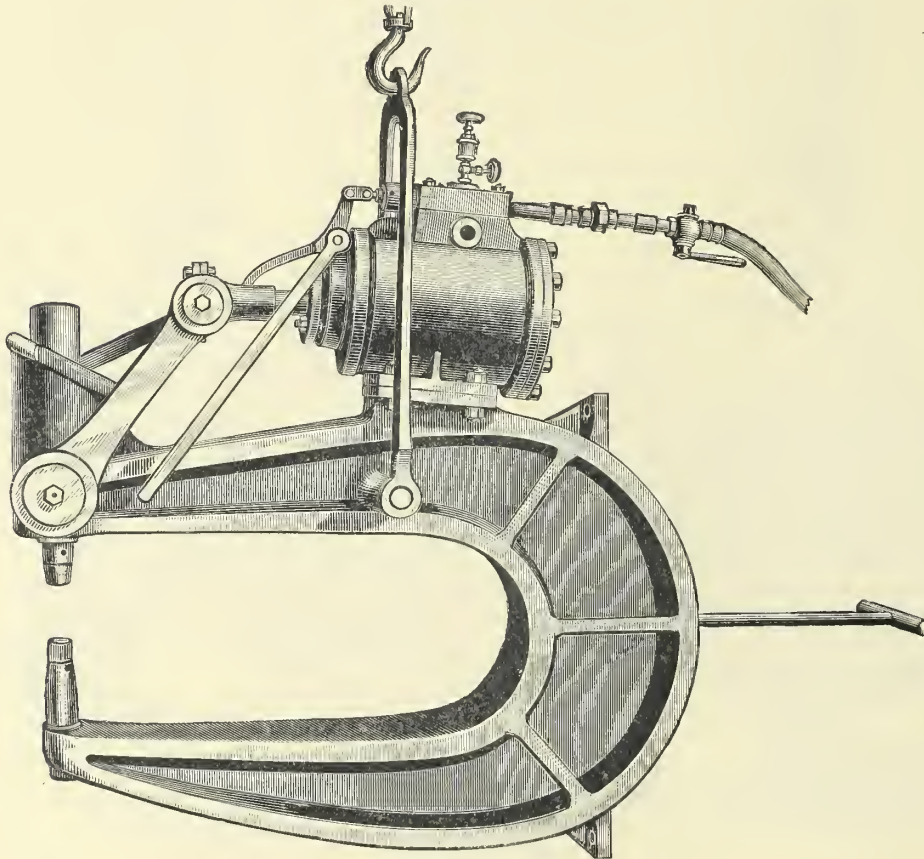
The machines are balanced so that when suspended, the same can operate either vertical or horizontal, as may be found most convenient.

Machines above 25 inch reach are provided with lugs, as shown on next page, capable of fixing the same as a stationary machine whenever desired.

Weight of arm D, 210 and 225 pounds. Price of arm, made interchangeable and to fit riveter, shown in Fig. 631, \$100.00.

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FIG. 634.



JAW RIVETERS.

OPERATED BY TURNING CYLINDER. SHOWN ON PAGES 522, 523 AND 524.

By actual experiments we have found that the pressure upon the rivets in gross tons is as follows:

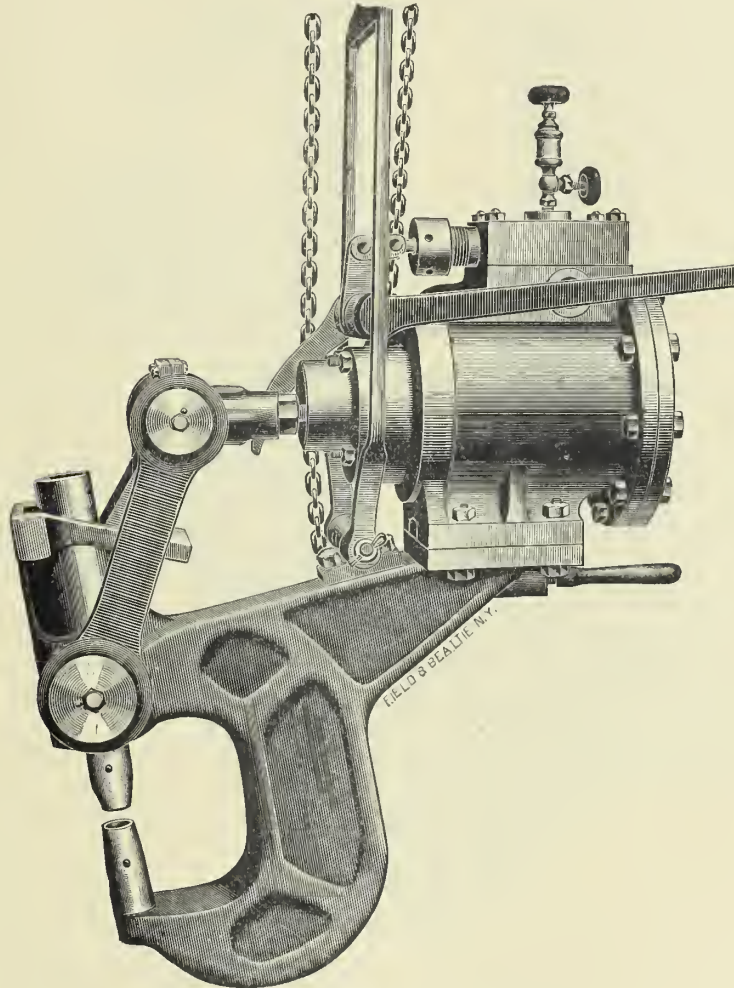
At 50 pounds pressure in Air Receiver,	-	-	-	-	-	25.9 tons
At 60 " " " "	-	-	-	-	-	30.2 "
At 70 " " " "	-	-	-	-	-	34.5 "
At 75 " " " "	-	-	-	-	-	36.6 "
At 80 " " " "	-	-	-	-	-	38.8 "
At 85 " " " "	-	-	-	-	-	42.0 "

PRICES AND DIMENSIONS OF THE DIFFERENT SIZES IN WHICH THESE RIVETERS ARE BUILT.

Reach at Center.	Distance between Arms.	Working Cylinder.	Weight.	Price.
10½ inches	15 inches	10 inches	950 pounds	\$700.00
17 inches	15 inches	10 inches	1100 pounds	750.00
25 inches	15 inches	10 inches	1290 pounds	850.00
34½ inches	15 inches	10 inches	1800 pounds	1100.00
36 inches	20 inches	12 inches	3000 pounds	1300.00
55 inches	20 inches	12 inches	3300 pounds	1400.00
5½ inches	8 inches	8 inches		400.00
16 inches	9 inches	8 inches		450.00
19 inches	10 inches	8 inches		500.00
48 inches	9 inches	8 inches		875.00

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FIG. 635.



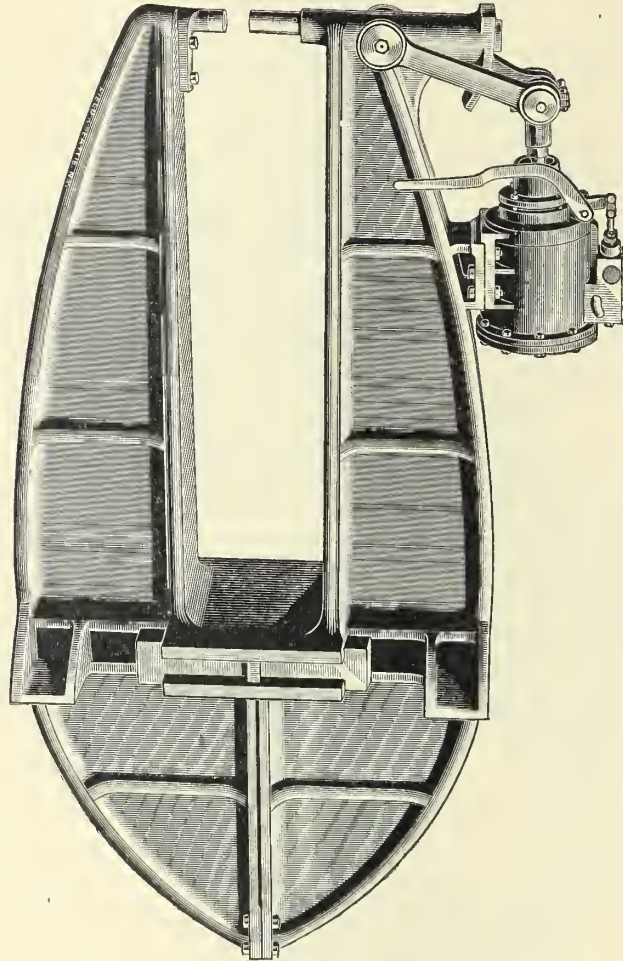
RIVETER FOR LATTICE COLUMNS.

THIS RIVETER is intended for riveting small plates to channel trusses forming lattice columns, and of sufficient strength to operate on $\frac{7}{8}$ inch rivets.

Price of riveter,	-	-	-	-	-	-	-	-	-	\$550.00
Weight,	-	-	-	-	-	-	-	-	-	780 pounds

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FIG. 636.



STATIONARY BOILER RIVETER.

THIS STATIONARY RIVETER is designed for the heaviest description of work. Cylinder separate from main upright, 12 inches diameter, 12 inch stroke. Setting 1 inch boiler plates and $1\frac{1}{4}$ inch rivets it can be operated by steam or compressed air.

The machine is properly proportioned and made of the best materials in a strictly first-class manner.

Four sizes of machines can be furnished with stake 60, 72, 84 and 96 inches long. The cylinder is 12 inches diameter ; stroke, 12 inches.

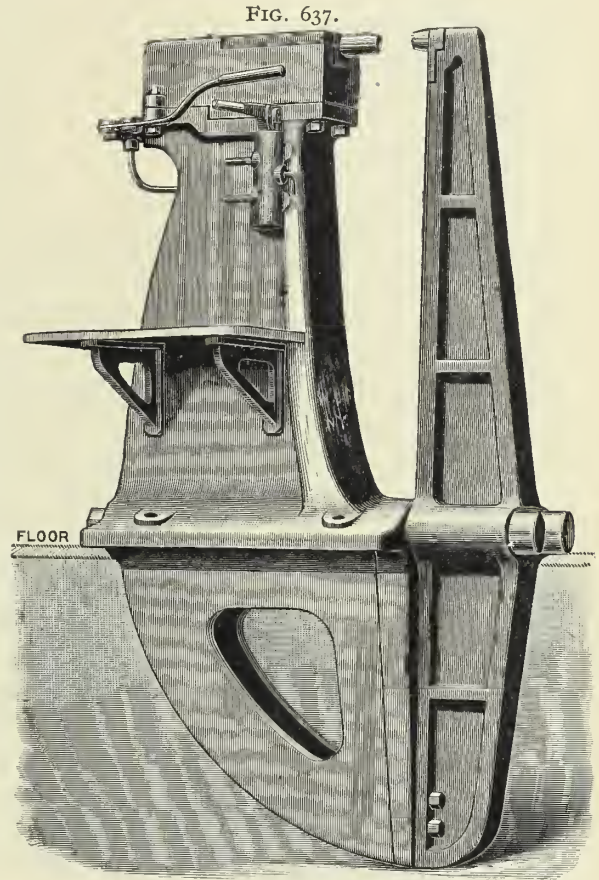
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VERTICAL GAP RIVETING MACHINE.

6 FOOT GAP FOR $\frac{3}{4}$ INCH RIVETS. 8 FOOT GAP FOR 1 INCH RIVETS.

(Description Fig. No. 637 with 6 foot Gap.)

THIS MACHINE as shown has a large steel stake, held in tension strain by the two steel bolts shown, one upon each side of the machine. The other part of the jaw is cast iron, and has attached to the upper end of it one of our removable, interchangeable heads, with a 7 inch hydraulic cylinder giving a pressure of about 28 tons, at 1500 pounds to the square inch. Angle pieces are placed upon the side of the machine at the proper height for a platform. The machine weighs, for this capacity, about 14000 weight, and is operated entirely by a single lever, shown in the side view; the sliding head being flush with the top of the machine, and sliding in large guides, allowing two angle irons to be riveted back to back in the middle of a sheet, if such a job was desired; the depth of the jaw being nearly 6 feet 2 inches for the machine sold for 6 foot gap. If a clamp is desired in addition to the riveter, then we place upon the machine a different kind of a head, having two concentric rams, one of them operating the clamp, and the other for heading the rivet; both operated independently of each other, and returning to position automatically. Price for plain machine is \$1750.00. Clamp extra, \$150.00.



(Description Fig. No. 637 with 8 foot Gap.)

THIS MACHINE as shown has a large steel stake, held in tension strain by the two steel bolts shown one upon each side of the machine. The other part of the jaw is cast iron, and has attached to the upper end of it one of our removable, interchangeable heads, with $8\frac{1}{2}$ inch hydraulic cylinder giving a pressure of about 40 tons at 1500 pounds to the square inch. Angle pieces are placed upon the side of the machine at the proper height for a platform. The machine weighs, for this capacity, about 22500 pounds, and is operated entirely by a single lever, shown in the side view; the sliding head being flush with the side of the machine, and sliding in large guides, allowing two angle irons to be riveted back to back in the middle of sheet, if such a job is desired; the depth of the jaw is nearly 8 feet 2 inches for the machine sold for 8 foot gap. If a clamp is desired in addition to the riveter, then we place upon the machine a different kind of head, having two concentric rams, one of them operating the clamp, and the other for heading the rivet; both operated independently of each other, and returning to position automatically. The price of this machine without clamp is \$2250.00. Clamp extra, \$250.00.

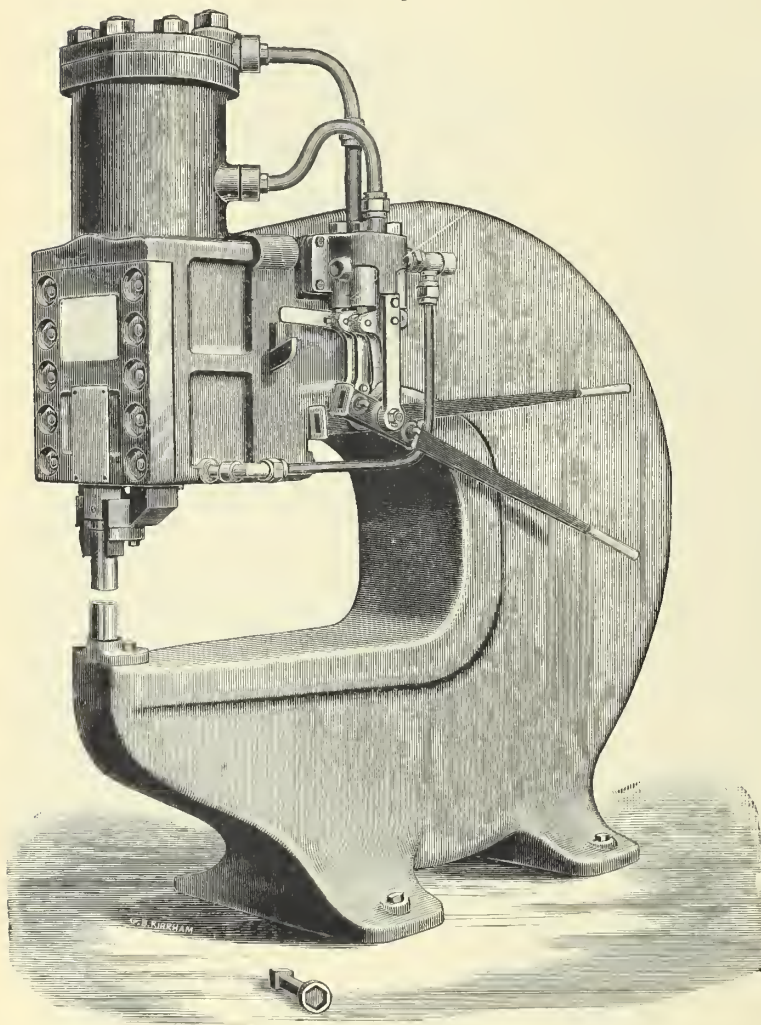
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FIG. 638.

DOUBLE-ACTING HYDRAULIC RIVETER.

HORIZONTAL GAP. 36" GAP FOR $\frac{3}{4}$ " RIVETS.

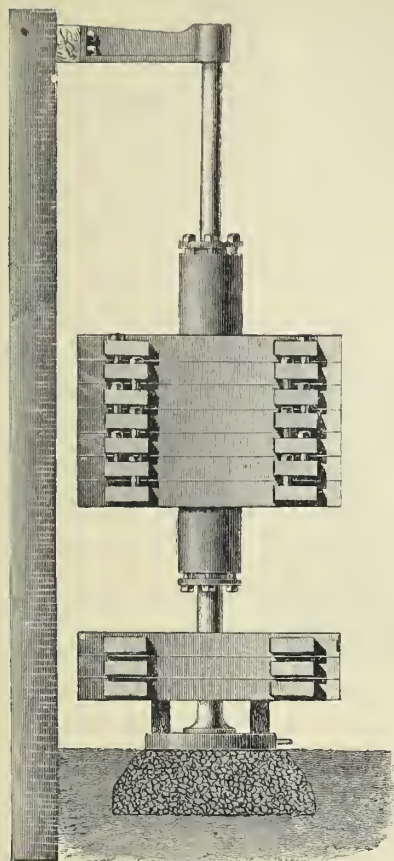
THE machine shown by this cut was made originally for riveting up ship frames, and for that purpose has a double-acting cylinder, one ram connected with a compressor for tightening the plates and the other for setting the rivet. In the cut the upper pipe connects with the cylinder at a point above the riveting ram. The lower pipe, which is connected up to the piping outside of the governing valve, and in direct connection with the accumulator, connects with small cylinders, three in number, situated in a small block at the lower end of the guide, one of which returns the riveting ram, the other two returning the compressor ram. The small lever shown projecting from the side of the machine is connected with the riveting ram in such a way that the dies, in case nothing is interposed will not come together and become injured, which they are liable to do in case they strike, as the using of heated rivets draws the temper of tempered tools. The machine has a stroke of five inches for each of the rams, and the rivet die is inclosed by the compressor, instead of being open, as shown in the cut for illustration. Two levers are used for the complete manipulation of the tool, one of them throwing the accumulator pressure on the compressor ram, the other on the riveting



ram, and each of them working under a pressure of about twenty tons, the accumulator pressure being 1500 pounds to square inch. The release of the accumulator pressure upon the compressor ram allows that much additional pressure to be exerted upon the riveting ram, or making a total of about forty tons for finishing the head of the rivet. In operation it is found that the two levers may be brought down together, and that the compressor ram will travel sufficiently fast to get the plates closed before rivet dies strike the end of the rivet. The operating valves are metal-seated valves, with passages not easily described, connecting the four valves. The hydraulic cylinders of this tool are made to be taken off from the body of the machine, so that there will be a certain interchangeability of heads upon different size machines of the same capacity. The front face of the machine is made almost flush with the rivet dies, so that any work may be placed in front of it, and riveting done on the angle iron, which is backed by a flat plate, there being no trouble to close and rivet 3 inch angle irons.

Weight, - - - - - 5800 pounds.

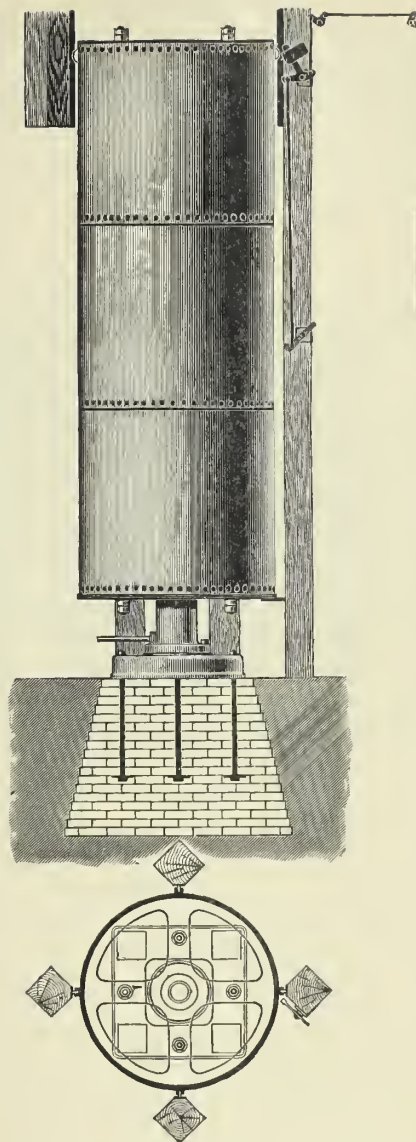
FIG. 639.



VARIABLE PRESSURE ACCUMULATOR.

WE have at times been called on to furnish accumulators which at one time are desired to exert on one kind of work a low pressure, and an hour later may be desired to exert a high pressure. In order to do this we have designed this style. The ram extends through the cylinder, which has packings at each end. The ram being smaller at the upper end, the cylinder is raised at a speed depending on the variation of the two diameters. The weights are cast square with lugs on two sides, and by the insertion of bolts any number of weights desired may be lifted; the change being made from one pressure to another in a few minutes, the extra weights remaining upon the corner blocks. This style of accumulator is advisable when high pressures are to be used, as the center of gravity is always well below the point of support. We can furnish complete, with weights, or will furnish ram and cylinders, and allow customers to furnish the weights from drawings which will be furnished.

FIG. 640.

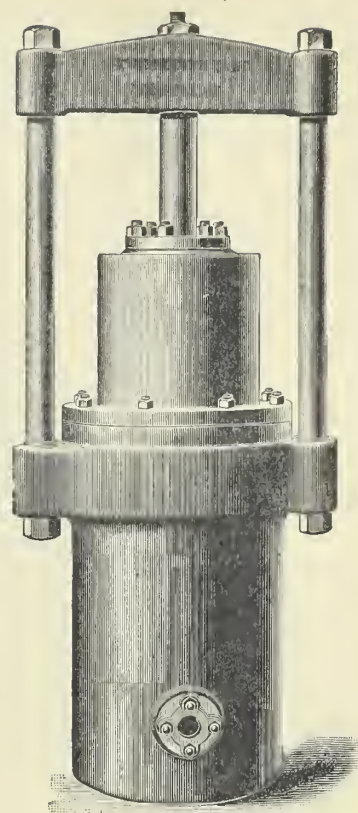


HYDRAULIC ACCUMULATOR,

WITH FIXED CYLINDER RESTING UPON ITS BASE.

WHEN the greater part of the work of a hydraulic system is done at a low pressure, and only a limited amount of liquid is required at a considerable additional pressure, we have furnished this tool. The low pressure liquid is let into the machine at the bottom, below the large piston, which drives a smaller piston into a second cylinder, inserted in it, the connection to the upper cylinder being at the top of iron beam, the difference in proportion to the area of the two rams. The upper cylinder fills from an independent source through a check valve when the liquid is drawn off the lower cylinder. The one from which this cut was made has a low pressure cylinder, 16 inches and 27 inches stroke, high pressure cylinder $3\frac{3}{4}$ inches and 27 inches stroke. Price, \$

FIG. 641.

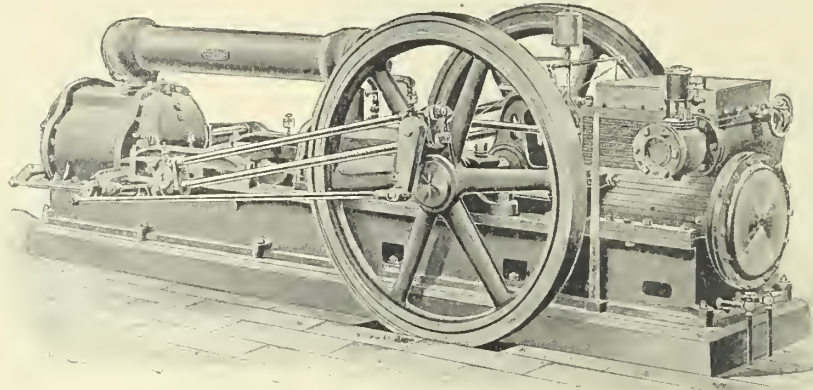


HYDRAULIC INTENSIFIER.

THIS MACHINE, as shown in the view, has a heavy cast iron cylinder, with steel ram; the packing being placed beneath a gland at the top of the cylinder, where it may be easily reached for repacking, if desired. The weight case surrounds the cylinder and is double; the interior tube being slightly larger than the cylinder, and is prevented from coming in contact with it by the stay-bolts extending from the outside to inside cylinder, the outside cylinder having guide rolls upon the post. The guide rolls in the head are adjustable for wear or for position, so that the machine will line accurately, and stay-bolts from the cross at the top of the weight case to the bottom carry the weight. The wrought iron cases have diameter of 54 inches and 16 inches. These machines are tested for a working strain of 2500 pounds per square inch, though the usual working limit for this line of tools is between 1500 and 2000 pounds, if portable machines are likely to be brought into use. In case portable machinery is not to be used, then higher pressures can be used to advantage. The proper trip levers for stopping and starting the pump and the guide irons are furnished with the accumulator. About 27 tons of scrap iron are required for 2000 pounds to square inch, and about 27 feet vertical space is necessary and about 5 feet square outside of posts. Price, 6 inches ram x 12 feet, \$700.

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FIG. 642.



STANDARD AIR COMPRESSORS.

IN the following list it will be observed that the large air cylinder gives the capacity of the machine. It will also be borne in mind that the small piston only encounters the pressure of the final compression, and hence a smaller steam cylinder or a higher rate of expansion can be used with the compound compressor than is possible with a compressor of equal power constructed in any other manner. This fact insures the highest economy in steam consumption.

Prices are quoted only to hold good for reasonably prompt acceptance.

Every machine fully guaranteed.

Diameter of Air Cylinder.	Length of Stroke.	Diameter of Compressing Cylinder.	Diameter of Steam Cylinder.	Revolutions or Double Strokes per Minute.	Capacity Cubic Feet per Minute.	Steam Pipe.	Exhaust Pipe.	Air Pipe.	Water Pipe.	Horse Power.
8 inches	10 inches	5 inches	8 inches	200	116	2 inches	2 ½ inches	2 inches	½ inch	15
10 inches	12 inches	6 ¾ inches	10 inches	190	207	2 ½ inches	3 inches	2 ½ inches	¾ inch	28
14 inches	16 inches	9 ½ inches	14 inches	150	427	3 inches	4 inches	4 inches	1 inch	55
20 inches	24 inches	13 ½ inches	20 inches	110	960	5 inches	6 inches	5 inches	1 ¼ inch	125
26 inches	30 inches	17 ½ inches	24 inches	90	1659	6 inches	8 inches	6 inches	1 ¼ inch	215
32 inches	36 inches	21 ½ inches	30 inches	80	2686	7 inches	10 inches	8 inches	1 ½ inch	350

We can also furnish, and shall be pleased to mail, description and price of the following Compressors for carbonic acid :

Belt-driven Compressors, Compound Compressors, Combination Steam and Water Power Compressors, Double Compound, Duplex, Compressors for Coal Mines, for Locomotives, for Natural Gas, for High Speed, Geared Compressors, Hand Power, High Altitude, Non-Compound, Oscilating, Sectional and Light Weight.

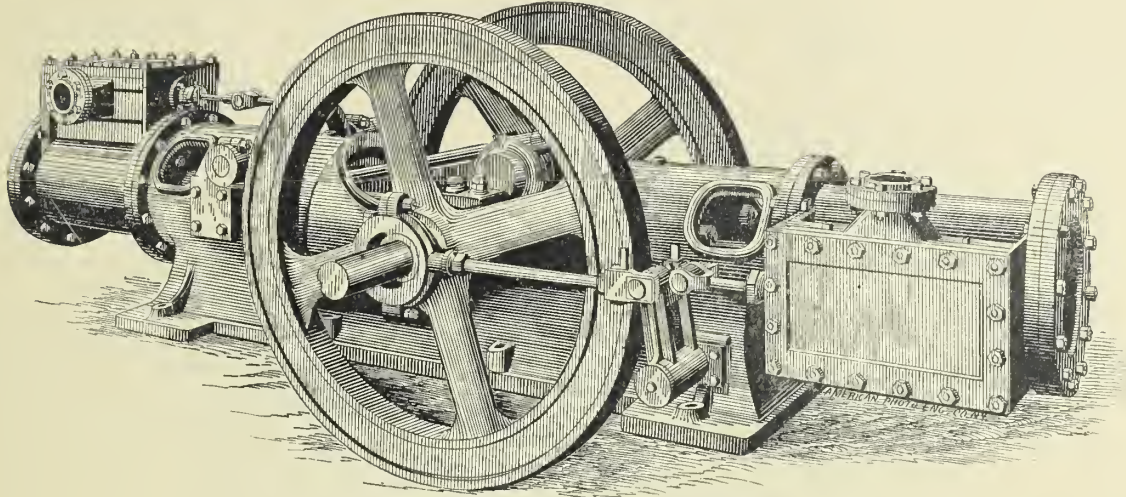
Some of the prominent advantages are :

Dry air, high speed, light weight, full air supply, uniform strains, highest economy, steam expansion, utmost strength, greatest capacity, small floor space, cold induction air, uniform air pressure, cheap transportation, unequaled durability, least loss in clearance, inexpensive foundations, complete cooling attachments, no working stress on main shaft, air valves with mechanical movements.

Every possible improvement adopted and used as soon as thorough test demonstrates its desirability.

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FIG. 643.



HIGH SPEED AIR COMPRESSOR.

WORKED BY A STEAM CYLINDER.

THESE illustrations represent Mr. Allen's Air Compressors, worked by a steam cylinder and by a belt, as adapted for use for our riveting machines, either of which may be used for the boiler riveters, but for the compression riveters a compressor operated by a steam cylinder should be used on account of the higher pressure employed.

The principal features of this compressor are : first, positive moving valves during the whole extent of their motion ; and, secondly, heavy reciprocating parts.

By the use of positive moving valves on the air cylinder, any amount of speed can be obtained, in distinction to compressors heretofore made with self-acting valves, whereby the speed of the machine is limited, to allow sufficient time, naturally required, for the valves to open and close ; and where, if the machine is run at anything approaching high speed, the machine loses all control of the valves, especially of the induction valves, through their inertia when at rest and their momentum when in motion, in consequence of which an air cylinder constructed with self-acting valves will compress less air at the higher speed than it does at a lower speed.

By the invention of Mr. Allen, of applying positive moving valves to the air cylinder, the quantity of air compressed is in direct proportion to the speed of the machine.

The steam and air cylinders are arranged in a direct line, and their respective piston rods are connected together so as to form one rod, upon which heavy weights are arranged, forming the guides and crosshead of the machine. By the use of these heavy reciprocating parts, the air is compressed with a considerable saving of power, when the pistons of the steam and air cylinders are upon the same reciprocating piston rod, and the latter is connected direct to the crank shaft.

The part which these heavy reciprocating weights perform in the economy of power, consists by absorbing the force of the steam at the commencement of the stroke in putting this weight in motion and returning it at the latter part of the stroke by its momentum.

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High Speed Air Compressor—Continued.

This avoids the transmission of the load through the shaft, and the revolving of the latter while under this load.

When the reciprocating parts have but little weight, the whole of the force of the steam will be thrown upon the shaft at the commencement of the stroke to get it into the fly wheels, and as the latter part of the stroke, when the power is actually required to compress the air, the fly wheel throws the load upon the shaft again in compressing the air in the cylinder.

We have at present about one hundred and fifty of these air compressors in operation.

The belt compressors, supplying air of from 25 to 30 pounds pressure, as required for the boiler riveters, and the compressor, operated by a steam cylinder supplying air from 50 to 80 pounds pressure, as used for the lever and jaw riveters.

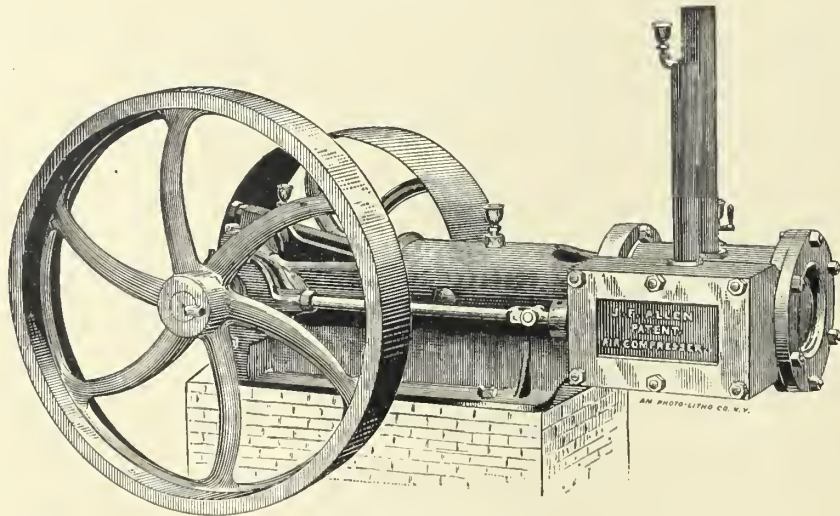
These compressors will furnish sufficient air for two riveters by increasing the speed of the same.

The size of the air cylinder for either style of riveter is 8 inches diameter by 7 inches length of stroke, while the steam cylinder for the boiler riveter is 7 inches diameter, and for the compression riveters 8 inches diameter by 7 inches length of stroke.

By experiment it has been proved that Allen's Air Compressors supply nearly double the quantity of air at any pressure in comparison with any other compressor of same capacity of cylinder.

Weight,	-	-	-	-	-	1780 pounds.
Price,	-	-	-	-	-	\$550.00.

FIG. 644.



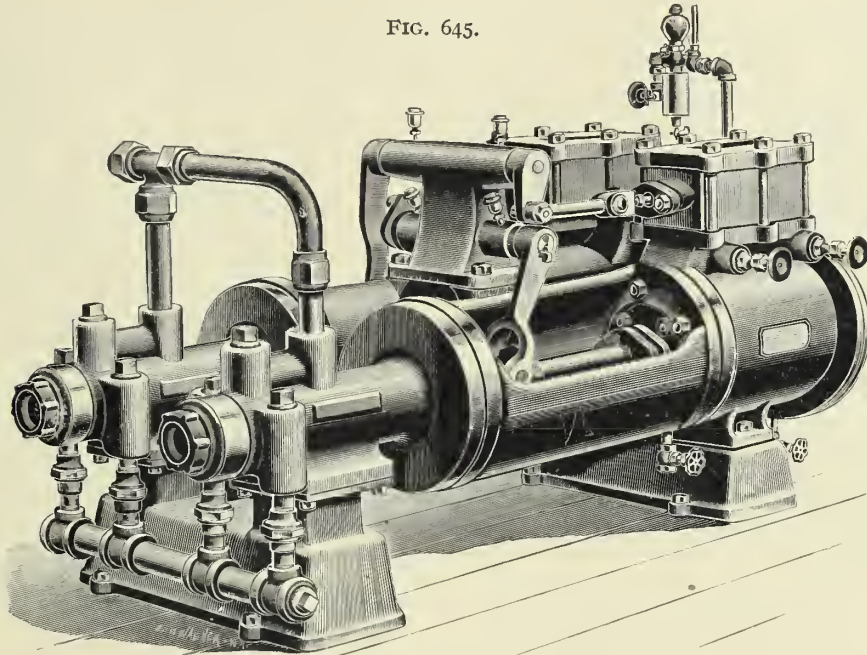
AIR COMPRESSOR.

OPERATED BY A BELT.

Weight,	-	-	-	-	-	1085 pounds.
Price,	-	-	-	-	-	\$350.00.

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FIG. 645.



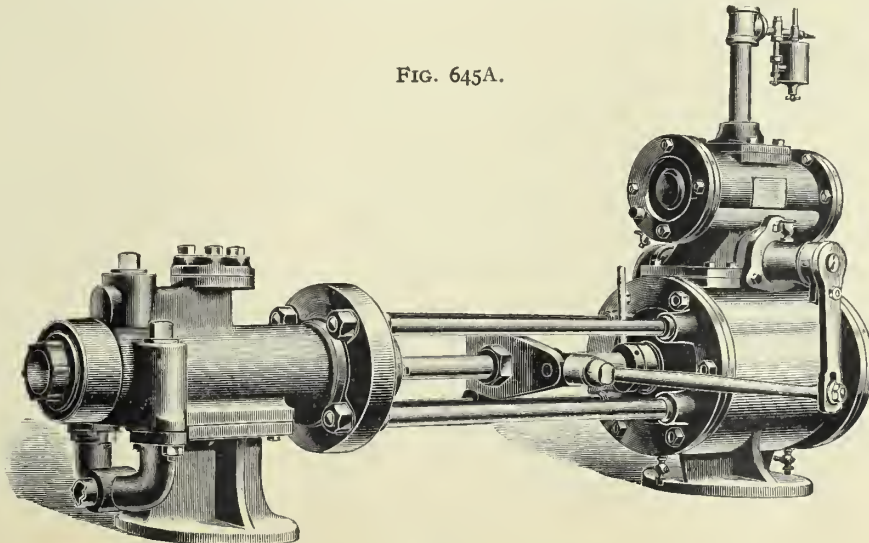
DUPLEX STEAM HYDRAULIC PUMP.

THIS PUMP is a very compact one, requiring little more than one-half the space ordinarily occupied by other makes. It has two double acting pistons (which can be packed from the outside of the pump), large suction valves, cast iron, steel or bronze water ends according to duty, with hydraulic metal valve seats. The steam ends are of latest designs and furnished complete with sight feed lubricators and cups.

SPECIFICATIONS.

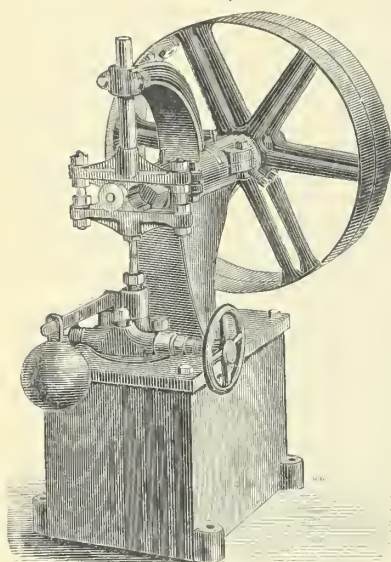
8 x 10 x $\frac{1}{4}$ inches or smaller piston,	steam $1\frac{1}{4}$ inches,	exhaust 2 inches.
10 x 10 x $2\frac{1}{4}$ inches or smaller piston,	steam 2 inches,	exhaust $2\frac{1}{2}$ inches.
12 x 12 x $2\frac{1}{4}$ inches or smaller piston,	steam $2\frac{1}{2}$ inches,	exhaust 3 inches.
14 x 12 x $2\frac{1}{4}$ inches or smaller piston,	steam $2\frac{1}{2}$ inches,	exhaust 3 inches.

FIG. 645A.



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PLAIN SINGLE PLUNGER BELT PUMP.



THIS is made in the most thorough manner, for use when an interrupted and small delivery is not undesirable. The shaft has two long Babbitted bearings ; valves are large and easy of access, requiring the unscrewing of one bonnet only to get either valve out.

The tank is 13 x 17 x 12 inches ; the pulleys 24 x 4 inches.

At 100 revolutions per minute the pump will deliver about 80 cubic inches per minute. Using the same amount of power and same speed, the delivery is as follows :

$\frac{3}{4}$ inch	piston will deliver about 80 cubic inches at 5000 pounds to square inch
$\frac{7}{8}$ inch	piston will deliver about 120 cubic inches at 3500 pounds to square inch
1 inch	piston will deliver about 135 cubic inches at 2500 pounds to square inch
$1\frac{1}{8}$ inches	piston will deliver about 180 cubic inches at 2000 pounds to square inch
$1\frac{1}{4}$ inches	piston will deliver about 225 cubic inches at 1500 pounds to square inch
$1\frac{1}{2}$ inches	piston will deliver about 300 cubic inches at 1200 pounds to square inch
$1\frac{3}{4}$ inches	piston will deliver about 375 cubic inches at 850 pounds to square inch

	Weight,	-	-	-	-	-	-	390 pounds
Price, $\frac{3}{4}$ to $1\frac{1}{4}$ inches piston*	-	-	-	-	-	-	-	\$140.00
Price, $1\frac{1}{8}$ to $1\frac{3}{4}$ inches piston,	-	-	-	-	-	-	-	160.00
Accumulator stop action with trips, extra,	-	-	-	-	-	-	-	15.00

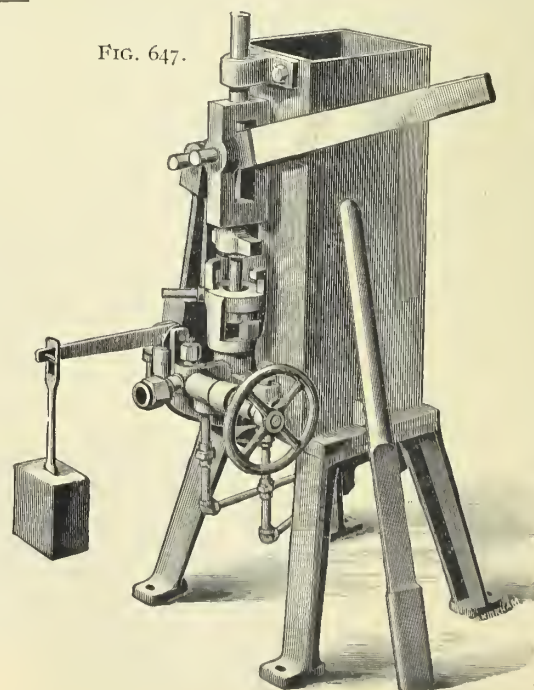
DOUBLE PLUNGER SIDE CISTERN HAND PUMP.

THIS PUMP is made in a first class manner, without any finish. As the cut shows, there are two plungers, one inside the other, with the locking ring surrounding the upper part of the larger, so that, by a motion of the small handle shown, the large plunger is fastened by it either to the pump or to the crosshead of the small plunger, giving pressures easily of about 1500 pounds per square inch with the large piston, and 6000 pounds per square inch with the small piston. The valves are both of them easy of access, either one being reached by simply unscrewing one bonnet. The wheel shown at the center releases the pressure, allowing the liquid to return to the tank.

The tank is 24 inches high, 8 x 10 inches across.

Price,	-	-	-	-	-	-	\$125.00
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When desired to be used for a test pump, the extra attachments, together with the hydraulic gauge registering to 6000 pounds per square inch, will be placed upon it at an extra expense of \$25.

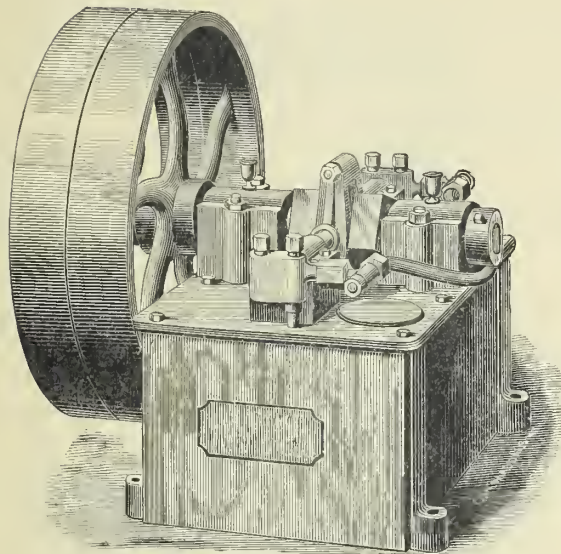


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FIG. 648.

PLAIN TWO PLUNGER BELT PUMP.

CROSSHEAD PATTERN.



THIS PUMP is the best made for use where a moderate delivery and a uniform pressure is required, as in accumulators.

The valves are easy of access, the bearings lined with Babbitt metal, the shaft is steel, there is a safety valve on each pump, and all wearing surfaces are arranged for adjustment. The stroke is two inches.

The pulleys are 30 x 4. The cistern 30 x 18 x 15, holding about 5000 cubic inches of available filling, and with $\frac{3}{4}$ inch plungers the pump will work well under 6000 pounds pressure to the square inch.

Release valve attached to pump, extra, \$10.00.

Using the same amount of power, each piston will do work as follows at 100 strokes per minute :

Plunger.	Pressure.	Volume of Water.	Price.
$\frac{3}{8}$ inches	9000 pounds	88 cubic inches	\$225.00
$\frac{1}{2}$ inches	6000 pounds	88 cubic inches	225.00
1 inch	3375 pounds	158 cubic inches	225.00
$1\frac{1}{4}$ inches	2650 pounds	200 cubic inches	235.00
$1\frac{1}{2}$ inches	2150 pounds	245 cubic inches	235.00
$1\frac{3}{4}$ inches	1500 pounds	353 cubic inches	235.00
2 inches	1100 pounds	480 cubic inches	275.00
$2\frac{1}{2}$ inches	825 pounds	678 cubic inches	275.00
3 inches	300 pounds	1400 cubic inches	275.00

Weight, - - - 1100 pounds.

FOUR PLUNGER BELT PUMP.

CROSSHEAD PATTERN, PLAIN STYLE.

THIS PUMP is similar in its general features to the Plain Two Plunger Pump, but delivers a larger and much steadier stream than that pump, as the cranks are turned at right angles, so that there is no point in the revolution when the flow is not continuous. All four chambers being connected, one safety valve suffices to release the pump from over-strain. The pump is driven by tight and loose pulleys 36 x 6 inches, which should have a speed of 80 to 100 revolutions. The cistern has 11000 cubic inches of available space for filling. The pump is built with any size pistons from $\frac{3}{8}$ inches to 2 inches and 2 inches stroke. The maximum delivery (at 100 revolutions) using the same amount of power is about as follows :

Inches.		Pounds.
$\frac{3}{8}$ pistons	225 cubic inches	9000 square inches
$\frac{1}{2}$ pistons	325 cubic inches	6000 square inches
$\frac{3}{4}$ pistons	450 cubic inches	4400 square inches
1 pistons	600 cubic inches	3375 square inches
$1\frac{1}{4}$ pistons	800 cubic inches	2650 square inches
$1\frac{1}{2}$ pistons	1000 cubic inches	2150 square inches
$1\frac{3}{4}$ pistons	1250 cubic inches	1500 square inches
2 pistons	2200 cubic inches	800 square inches

FIG. 648 A.

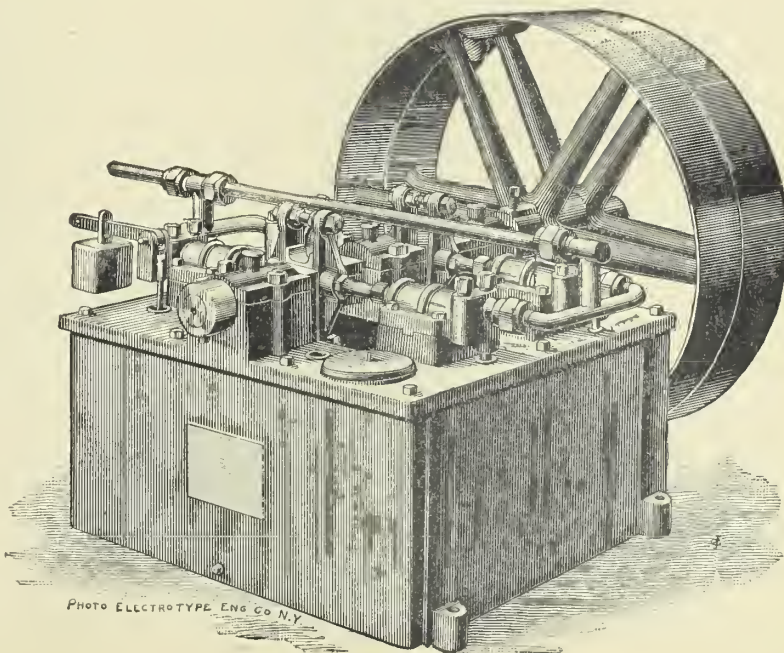
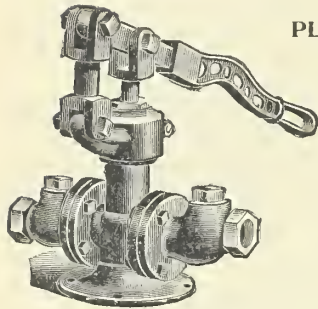


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FIG. 649.



PLAIN LOW PRESSURE TEST PUMP.

(Description Fig. No. 649.)

THIS PUMP has an iron barrel and globe valves for both suction and discharge, and is to be used in cases where the pressure does not exceed 600 pounds per square inch. The plunger is one inch in diameter.

SMALL SINGLE PLUNGER PRESSURE PUMP.

(Description Fig. No. 650.)

THIS PUMP has a very small cistern, 7 x 8 x 6 inches. The connection for pipe being at the rear of the pump, as shown in the cut. In order to give steadiness and stiffness to the piston, it is given an extra long bearing in the body of the pump. By the handle shown on the pump a pressure of 450 pounds to the square inch can be obtained easily, while 2000 to 2500 pounds can be obtained by the use of a slip lever shown in front of the pump.

1 1/2 piston, 4 inch stroke, pressure, 2500 pounds.

3/4 piston, 4 inch stroke, pressure, 9000 pounds.

Weight, 70 pounds. 16 inches height over all. Price, \$50.00

FIG. 650.

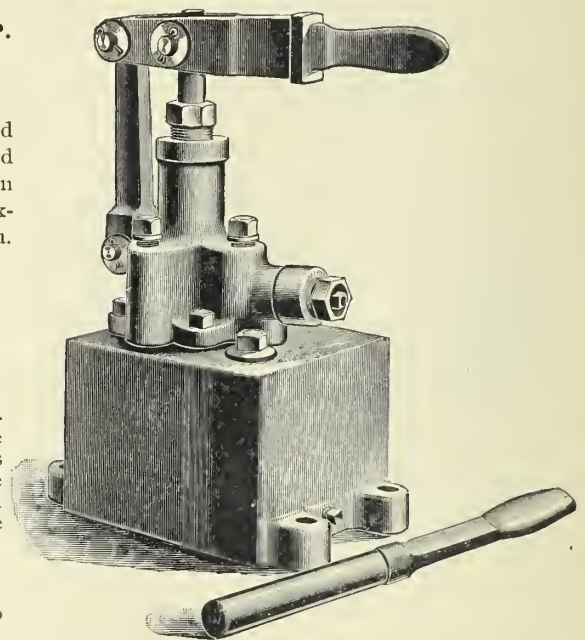
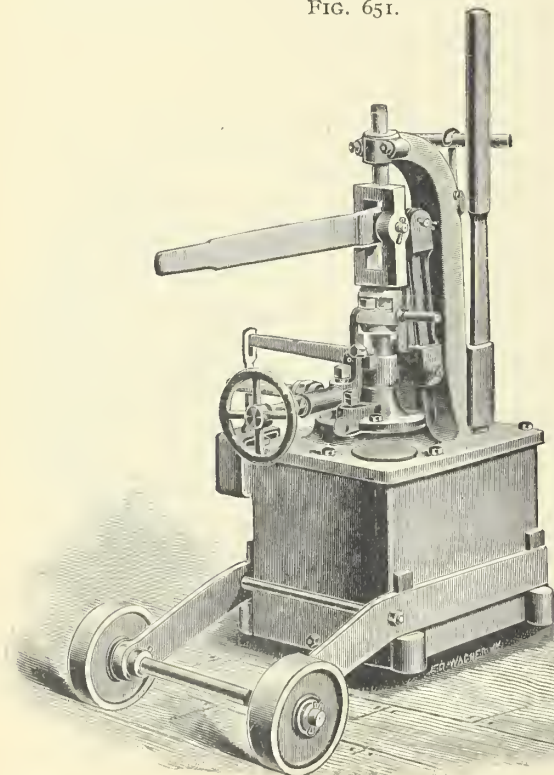


FIG. 651.



PORTABLE TESTING PUMP.

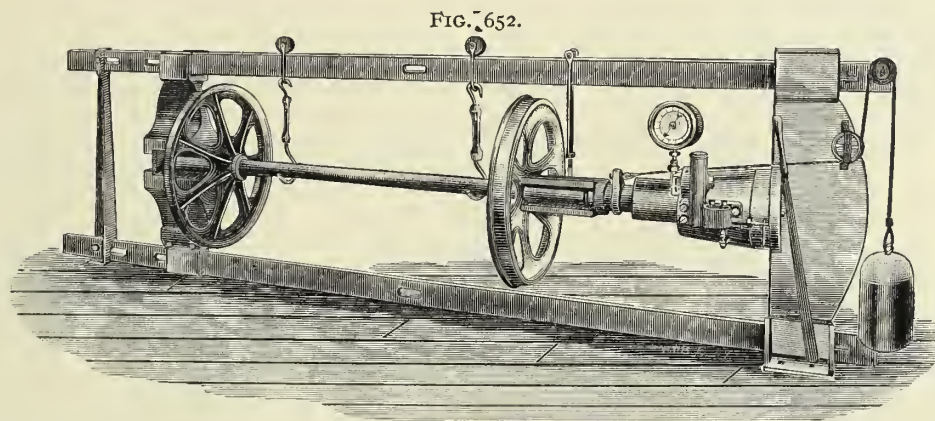
HIGH PRESSURE DOUBLE PLUNGER.

(Description Fig. No 651.)

THIS PUMP is a most convenient tool for general shop work where high pressures have to be obtained. The tank is underneath the pump and is mounted on three wheels, two brought well forward so that it will not overturn when the long lever is used; the third, a pivoted one, to which is attached the pulling handle. The piston is a double one, the outer one, with one man, giving a pressure of 1000 pounds per square inch without slip lever, and 2000 with it; the smaller piston, 4000 pounds without the slip lever, and 10000 pounds to the square inch with it. The change from one size piston is accomplished by bringing the piston clear down and turning the clutch. Both valves are situated where they are easily reached for examination, cleaning or regrinding, which has to be done occasionally when using high pressures. These pumps hold their high pressures for hours at a time without the use of extra stop valves. The gage has a 6 inch dial, all brass case, tool steel Bourdon spring, and is fitted with our improved safety coupling, for preventing shocks to the works.

Weight, about 390 pounds.

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HAND POWER HYDRAULIC WHEEL PRESS.

THIS improved press embraces many changes from those first made, and is now a very complete tool for street railroad shops, small railroad repair shops and engine shops for forcing in shafts, etc. The hydraulic part is most reliable and convenient style of large jack. The lever works horizontally at right angles to line of press, and convenient for operator to easily watch the work. The valves are large, perpendicular and easy of access. The piston is entirely enclosed, thus preventing all grit or foreign material getting into the pump and cutting or preventing its working. The cylinder is made from crucible steel and has a good bearing on stationary beam. The movable beam runs on rollers upon the lower bar, which is planed. It is recessed so that blocks may be placed in it of sufficient thickness to act as a template in forcing on car wheels, etc. A swinging chuck placed against the ram or jack acts as a template for the other end of axle. The block can be also used when forcing a shaft into a wheel. The pull-back weight is suspended from upper bar and does not require any pit.

60 ton press complete for 30 inch wheels, weighs about 1900 pounds,	- - - - -	\$350.00
60 ton press complete for 36 inch wheels, weighs about 2500 pounds,	- - - - -	425.00
100 ton press complete for 36 inch wheels, weighs about 2700 pounds,	- - - - -	475.00
100 ton press complete for 40 inch wheels, weighs about 3500 pounds,	- - - - -	525.00
125 ton press complete for 48 inch wheels, weighs about 4500 pounds,	- - - - -	575.00

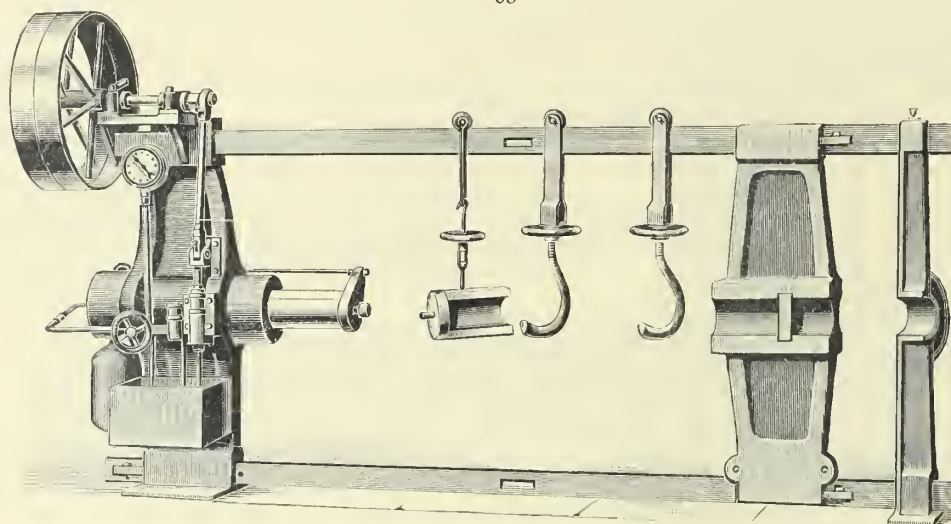
Larger sizes or power presses to order. A gauge will be placed on each press unless otherwise ordered.

We make 60 ton press for 30 inch wheels, of special patterns, for export, where the heaviest pieces weigh not over 225 pounds, so that they may be carried by mules. It is known by us as the mule back pattern.

Price, - - - - - \$425.00

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FIG. 653.



BELT POWER WHEEL PRESS.

SINGLE PLUNGER PUMP, CRANK SHAFT PARALLEL TO TENSION RODS.

THE only difference between the two belt power styles of this press are those made necessary by the position of the driving shaft, or to suit the condition of shop shafting. The above cut shows the crank shaft parallel with the tension rods. We also make the press with crank shaft at right angles when desired. Pulleys are 30 x 4 inches and should be run from 80 to 100 revolutions per minute.

The suction and pressure valves are both easy of access by separate bonnets situated on top of pump casting. The pump pistons are packed with a compressive packing and screw gland, which is tight, and yet works with no undue friction. Return weights, water tank and pressure gauge are furnished. All pumps have safety valves. This style furnished unless otherwise specified.

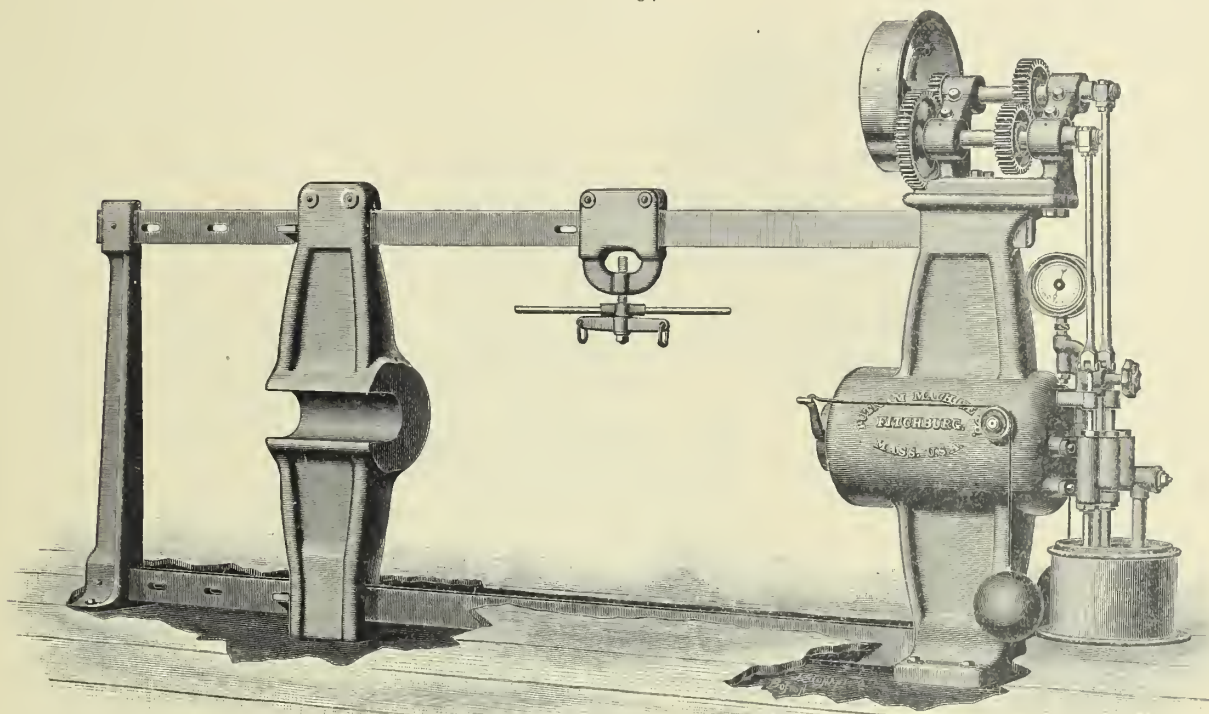
SPECIFICATIONS.

Size Car Wheels.	Between Bars.	Power in Tons.	Movement of Ram.	Weight.	Price.
30 inches	34 inches	60	15 inches	3050 pounds	\$425.00
36 inches	40 inches	100	15 inches	5200 pounds	550.00
36 inches	40 inches	150	15 inches	6700 pounds	675.00
42 inches	46 inches	100	18 inches	6500 pounds	625.00
42 inches	46 inches	150	18 inches	7600 pounds	750.00
48 inches	52 inches	100	18 inches	6700 pounds	675.00
48 inches	52 inches	150	18 inches	8000 pounds	850.00
60 inches	64 inches	150	18 inches	10500 pounds	1050.00
72 inches	76 inches	200	18 inches	14000 pounds	1300.00
78 inches	82 inches	200	18 inches	16500 pounds	1700.00
78 inches	82 inches	300	18 inches	22500 pounds	1900.00

Double plunger pump, additional, - - - - - \$75.00

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FIG. 654.



48 INCH HYDROSTATIC CAR WHEEL PRESS.

FOR FORCING ON AND TAKING OFF CAR WHEELS.

THIS PRESS has high pressure and quick acting pumps; the former generates a pressure of 150 tons, the latter has a plunger $2\frac{1}{4}$ inches diameter, which gives a double quick action to ram up to a pressure of 15 tons. Cylinder is copper lined. Ram is $8\frac{1}{2}$ inches diameter, and has a run of 20 inches. Foot block is suspended on rolls, and is adjustable to position. Furnished with roller lifting jack, pressure gauge, lock-up safety valve, liquid tank, return weights and countershaft. Tight and loose pulleys on counter, 18 inches diameter, 5 inch face, and should make 420 revolutions per minute.

Ram pressure, 150 tons.

Weight, 7500 pounds.

52 INCH HYDROSTATIC CAR WHEEL PRESS.

FOR FORCING ON AND TAKING OFF CAR WHEELS.

This Press has high pressure and quick acting pumps; the former generates a pressure of 175 tons, the latter has a plunger $2\frac{1}{4}$ inches diameter, which gives a double quick action to ram up to a pressure of 15 tons. Cylinder is copper lined. Ram is $8\frac{1}{2}$ inches diameter, and has a run of 20 inches. Foot block is suspended on rolls, and is adjustable to position. Furnished with roller lifting jack, pressure gauge, lock-up safety valve, liquid tank, return weights and countershaft. Tight and loose pulleys on counter, 18 inches diameter, 5 inch face, and should make 420 revolutions per minute.

175 tons pressure.

Weight, 8000 pounds.

78 INCH HYDROSTATIC DRIVING WHEEL PRESS.

FOR FORCING ON AND TAKING OFF DRIVING WHEELS.

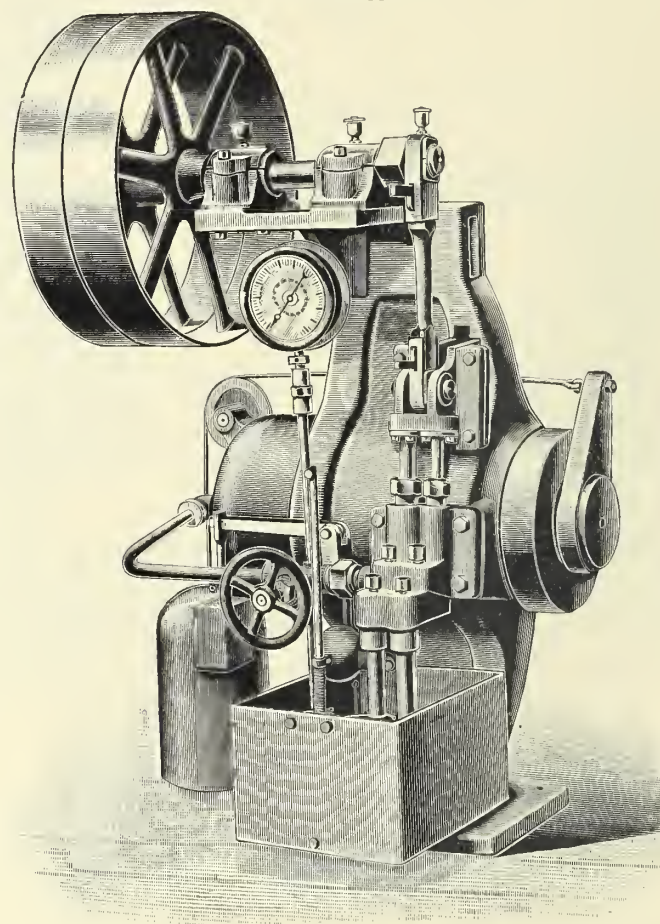
This Press has two independent acting pumps, by which the ram receives more steadiness of motion, and does its work quicker, without requiring any more power. Cylinder is copper lined. Ram is $10\frac{1}{2}$ inches diameter, has a run of 18 inches, and will sustain a pressure of 300 tons. Foot block is suspended on rolls, and is adjustable to position. Furnished with pressure gauge, lock-up safety valve, liquid tank, return weights and countershaft. Tight and loose pulleys on counter, 18 inches diameter, 5 inch face, and should make 420 revolutions per minute.

300 tons pressure.

Weight, 18900 pounds.

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FIG. 655.



BELT POWER WHEEL PRESS.

TWO PLUNGER SINGLE CRANK STYLE.

IN this press we have the two pistons of different sizes, so that the press may be run over a certain space without very much pressure, but with greater speed; then by turning the small handle which is shown by the side of the gauge pipe the low pressure piston is stopped in its delivery, and the high pressure piston continuing operation exerts the maximum power of the press. The press is reversed in its operation by the hand wheel shown in the middle of the cut; the safety valve being placed behind this valve. The pistons are packed with a gland packing, which can be easily tightened and also easily replaced. The valves are large, and all of the four valves easily reached by unscrewing a metal seated bonnet. The other parts of the press are the same as in our three other of wheel presses.

The additional expense for this style of press above that of the "Plain" is \$50.00.

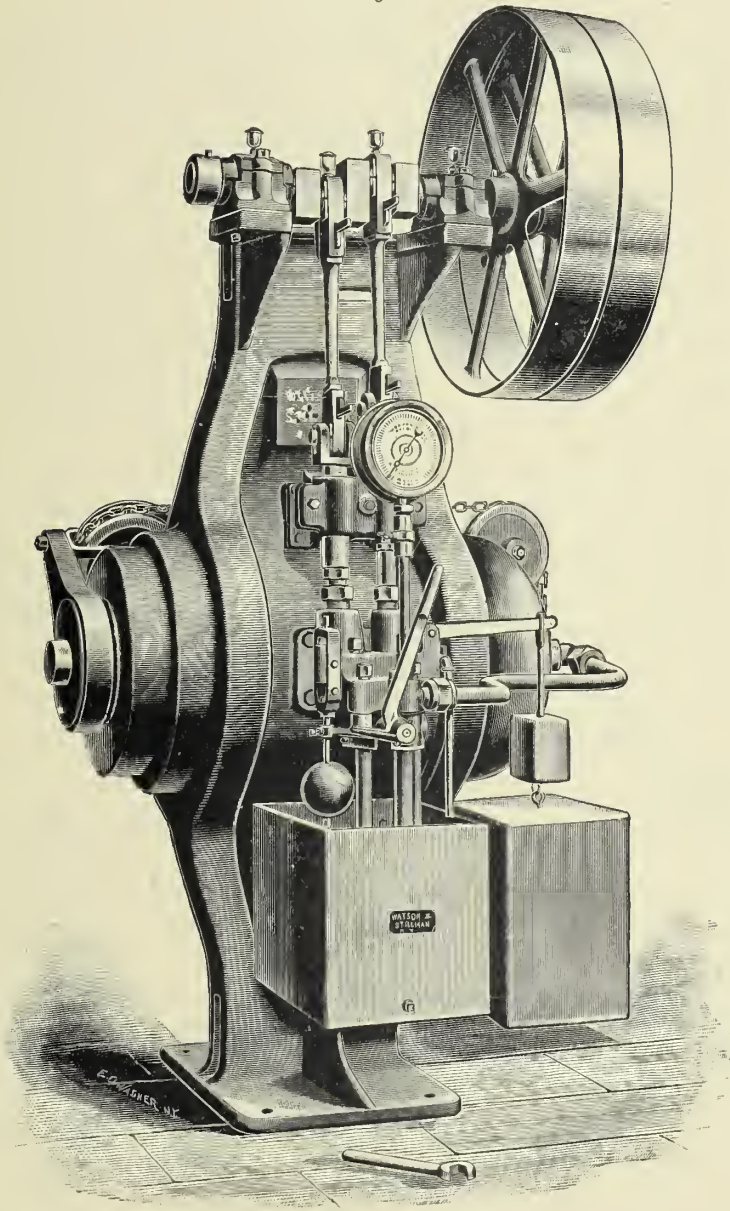
PRENTISS TOOL & SUPPLY CO.

FIG. 656.

BELT POWER WHEEL PRESS.

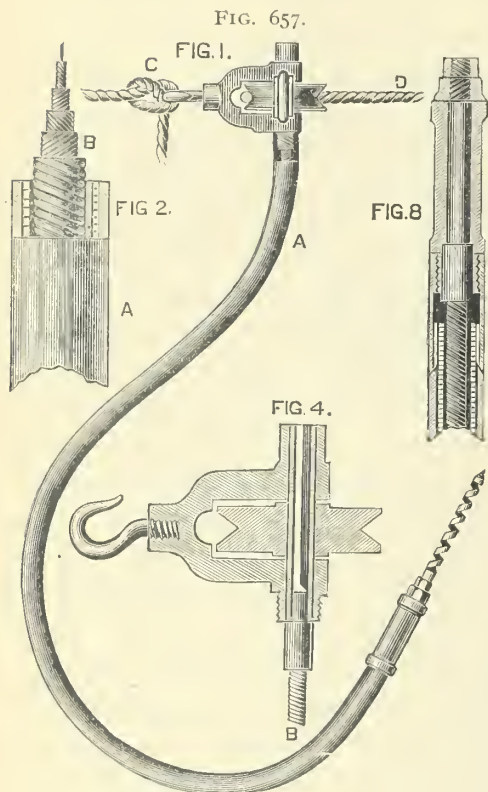
AUTOMATIC VARIABLE DELIVERY STYLE.

IN this press we offer several improvements over other presses. The small vertical lever shown inclined in the center of the cut governs the press completely. When in the position as shown the press will be driven out with its fastest speed. When a certain low pressure is reached (about $\frac{1}{3}$ the maximum power of the press) the round ball shown below it will raise automatically, and the action of the speed pump discontinued. When the maximum pressure desired is reached, the lever being brought forward will open a large patented double-seated valve, and allow the press to run back, the filling from the press returning one way while the delivery of the pump is returned to cistern through a different passage. The position of the operator is by the side of his work, and by the peculiar construction of the operating valve has complete control of the press while standing there, and also does not require to have word given him when to stop or start the pump. On the larger sizes there is placed upon the ram a pulley, and the pull back chain is attached at one end of the cylinder so that the weight is of double effect. There are two cranks upon the shaft, which is made of steel, with well adjusted and scraped bearings and connecting rods of the best pattern. The valves are of large size and easy of access for examination or repairing. Two single hooked axle supports are sent with the press. For press of this style add \$100.00 to corresponding size of plain style.



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FLEXIBLE SHAFTS.



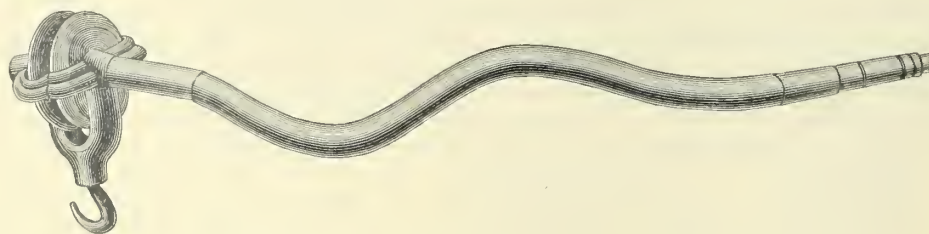
THIS cut is a sectional view of the Stow Flexible Shaft. Fig. 1, complete shaft; Fig. 2, construction of core; Fig. 3, hand piece; Fig. 4, head piece; A A, leather and wire case; B, core; C, cord for tightening belt; D, is driving belt. Core B must be kept well lubricated with lard oil, tallow or other animal oil. Never use mineral oil.

PRICE LIST OF FLEXIBLE SHAFTS, AS PER FIG. 658.

Selling Nos.	0	1	2	3	4
Diameter of core in inches, - - -	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$
Length of shaft in feet, - - -	3	$3\frac{1}{2}$	4	5	6
Weight, complete, as per cut, - - -	3	5	7	10	18
Price, complete, as per cut, - - -	\$16.00	18.00	25.00	30.00	40.00
Price per foot, extra, - - -	1.80	2.40	2.70	3.00	3.75

Selling Nos.	5	6	8	9
Diameter of core in inches, - - -	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{3}{8}$
Length of shaft in feet, - - -	7	8	8	8
Weight, complete, as per cut, - - -	30	35	60	80
Price, complete, as per cut, - - -	\$50.00	60.00	80.00	100.00
Price per foot, extra, - - -	4.50	5.25	8.25	12.00

FIG. 658.



BREAST DRILL.

THIS cut represents a Breast Drill. It is made of malleable iron, with steel spindles and thrust bearings, cut gears, which are covered as shown in cut, and has a clutch arrangement by which it can be thrown in and out of gear as desired. Made with clutch ends of different sizes to correspond with the shafts with which it is used.

	With Trump Chuck.	With Whiton Chuck.
No. 3 Breast Drill, - - -	\$12.00	\$13.00
No. 4 Breast Drill, - - -	13.00	14.00
No. 5 or 6 Breast Drill, - - -	14.00	15.00
No. 8 or 9 Breast Drill, - - -	15.00	16.00

Trump chuck takes drills from 0 to $\frac{1}{4}$ inch. Whiton takes drills from 0 to $\frac{1}{2}$ inch, inclusive. The drilling capacity is limited to the weight of the body.

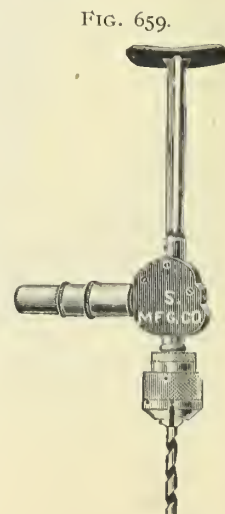


FIG. 659.

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PORTABLE SCREW FEED DRILL PRESSES.

We furnish five sizes, all of the same type as No. 8 shown in this illustration. They are accurately and carefully made with steel spindles and feed screw, cut gears, hardened stopping and starting clutch, which may be thrown in or out of gear at will. They are also arranged to take the Morse twist drills, as follows:

Nos. 3 and 4 have Morse taper socket No. 1, taking drills from $\frac{1}{4}$ inch to $\frac{1}{2}$ inch, inclusive. With No. 3 shaft, will drill to $\frac{3}{8}$ inch; with No. 4 shaft will drill to $\frac{5}{8}$ inch. Price, \$20.00.

No. 6 has Morse taper socket Nos. 2 and 3, taking drills from $\frac{3}{8}$ to $1\frac{1}{4}$ inches, inclusive. Price, \$25.00.

Nos. 8 and 9 have Morse taper sockets Nos. 3 and 4, taking drills from $1\frac{5}{8}$ to 2 inches. No. 8 press drills to $1\frac{5}{8}$ inches. No. 9 press drills to 2 inches. Price, \$30.00.

All drill presses are now fitted with steel clutch cases.

The drill presses are numbered to correspond with numbers of shafts with which they are used—thus, the No. 6 press drill is used with the No. 6 shaft.

FIG. 660.

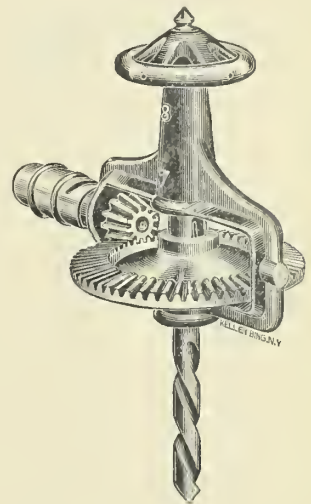
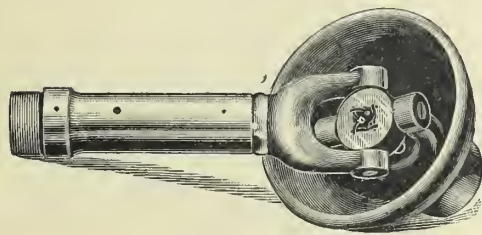


FIG. 661.



UNIVERSAL JOINT.

To prevent too sharp a bend at the end of the flexible shaft when using it in connection with an electric motor, use the universal joint with bell, as shown in this illustration (also see illustration of electric motor plant). This device greatly prolongs the life of the shaft, when used in this way, and also permits of a much shorter bend without injury to it. The standard pulley head is omitted when this is used and its price deducted from the shaft. We strongly recommend it when the shaft is attached to a motor or any other equally rigid driving shaft.

No. 3 universal joint,	-	-	-	-	-	-	-	-	-	-	-	\$16.00
No. 4 universal joint,	-	-	-	-	-	-	-	-	-	-	-	18.00
No. 6 universal joint,	-	-	-	-	-	-	-	-	-	-	-	20.00
No. 8 universal joint,	-	-	-	-	-	-	-	-	-	-	-	22.00
No. 9 universal joint,	-	-	-	-	-	-	-	-	-	-	-	23.00

When brass bells are desired, add \$2.00 each to the prices above given.

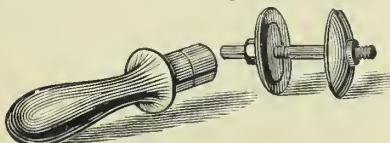
STOP CLUTCH.

This permits the working tool to be stopped and started at will without stopping the motion of the shaft itself. It is the same in principle as the clutch case of drill presses, made for Nos. 3, 4, 5, 6, 8 and 9 shafts. No. 3, \$4.50; No. 4, \$5.00; Nos. 5 and 6, \$6.00; Nos. 8 and 9, \$7.00.

FIG. 662.



FIG. 663.



CLAMP SPINDLE.

For holding all varieties of emery buffing and polishing wheels to be used on edge. We make a simple clamp spindle or mandrel with tight and loose washer and nut. This tool is used with Nos. 2, 3, 4, 5 and 6 shafts. Price, \$1.50. Extra heavy clamp spindle, price, \$3.00.

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FIG. 664.



PORTABLE EMERY GRINDER.

FOR cleaning and grinding heavy castings, for buffing and polishing all metals and glass, it is almost indispensable. For ordinary shop work, we usually sell either No. 4, 5, or 6 plant, the cost of which as shown in above cut would be as follows (less driving rope and couplings, the cost of which cannot be given without knowing the height of ceilings). This item will be added to the following totals :

1 No. 4 flexible shaft,	-	-	-	-	-	-	\$40.00
1 No. 4 stop clutch,	-	-	-	-	-	-	5.00
1 No. 4 clamp spindle,	-	-	-	-	-	-	1.50
1 No. 3 countershaft,	-	-	-	-	-	-	10.00—\$56.50

CENTER GRINDER.

AS will be seen by referring to the above cut, it is very simple. Consisting of a $3\frac{1}{2}$ foot flexible shaft, with friction pulley on one end, the other attached to a sliding spindle holding 3 inch emery wheel. The spindle turns in a tool post—same as an ordinary tool. It is as quickly set as any lathe tool, and can be used on any size lathe without any additional attachments. When desired, we can furnish a bracket to hold friction wheel against cone, which is adjustable to any size lathe, up to 36 inches.

It is well known that lathe centers cannot be turned and hardened accurately, while with this tool they can be ground perfectly true in five minutes, if used frequently. It is indispensable to any first-class machinist. Weight complete without bracket, 4 pounds; with bracket, 7 pounds.

Price with bracket and 3 inch emery wheel,	-	-	-	-	-	\$12.00
Price without bracket,	-	-	-	-	-	10.00

FIG. 665.

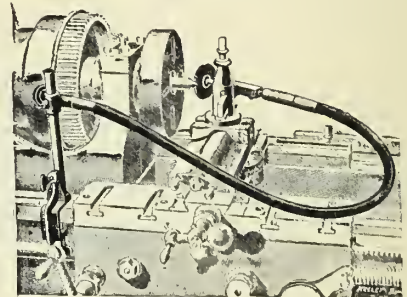
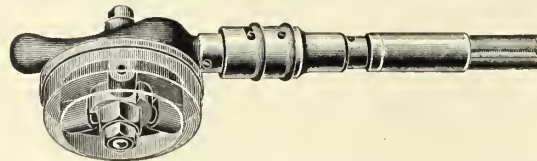


FIG. 666.



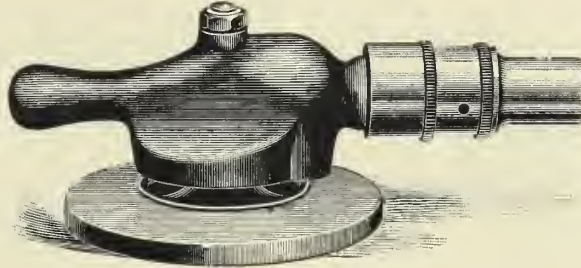
RING GRINDER.

WE would call the special attention of railroad master mechanics and machine shops generally to the above tool, which we have specially designed for grinding steam pipes, nigger heads, saddle joints, etc. The tool is very simple, light and durable and will do the work of at least four men grinding by hand and with equally satisfactory results. This machine takes rings from $4\frac{1}{4}$ to 5 inches inside measurements. On account of lightness and consequent ease in handling we would recommend its use with a No. 4 shaft, but it can be fitted to any size of flexible shaft at the following prices :

Fitted to No. 4 shaft,	-	-	-	-	-	-	-	-	\$20.00
Fitted to Nos. 5 and 6 shaft,	-	-	-	-	-	-	-	-	23.00
Fitted to Nos. 8 and 9 shaft,	-	-	-	-	-	-	-	-	25.00

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FIG. 667.



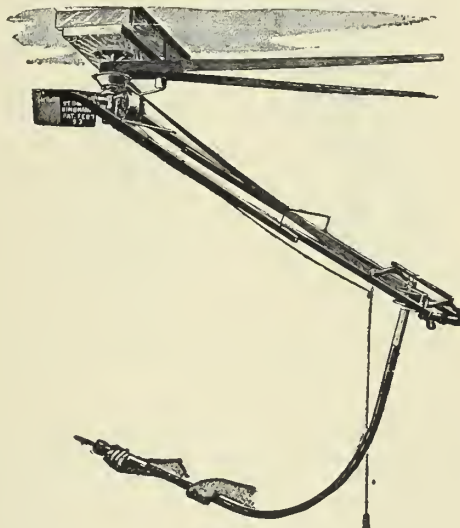
D MACHINE.

AS an adjunct to the Portable Emery Grinder, when used in connection with the flexible shaft, it is unsurpassed for the purpose for which it is designed, viz.: grinding, shaping and polishing flat surfaces. Not only in machine shops but in many of the largest plate glass factories it is regarded as an almost indispensable tool for grinding and polishing their product. Briefly described, it is attached to the shaft by a clutch case. The emery, sand or buffing wheels are inserted in a turned recessed plate and held firmly in position. It requires but a moment when a change of grade of wheels is required to unscrew one recessed plate and screw on another. We sell recessed plates at a very reasonable price as seen below, and one frame will receive any number of wheels of different grades. The tool is used with the same sized shafts as the portable emery grinder, viz.: 4, 5 and 6.

No. 4, price with one plate and clutch case,	- - - - -	\$12.00
No. 5 and 6, price with one plate and clutch case,	- - - - -	15.00
4, 5 or 6 inch, extra plates, each	- - - - -	.50

Other sizes made promptly to order.

FIG. 668.



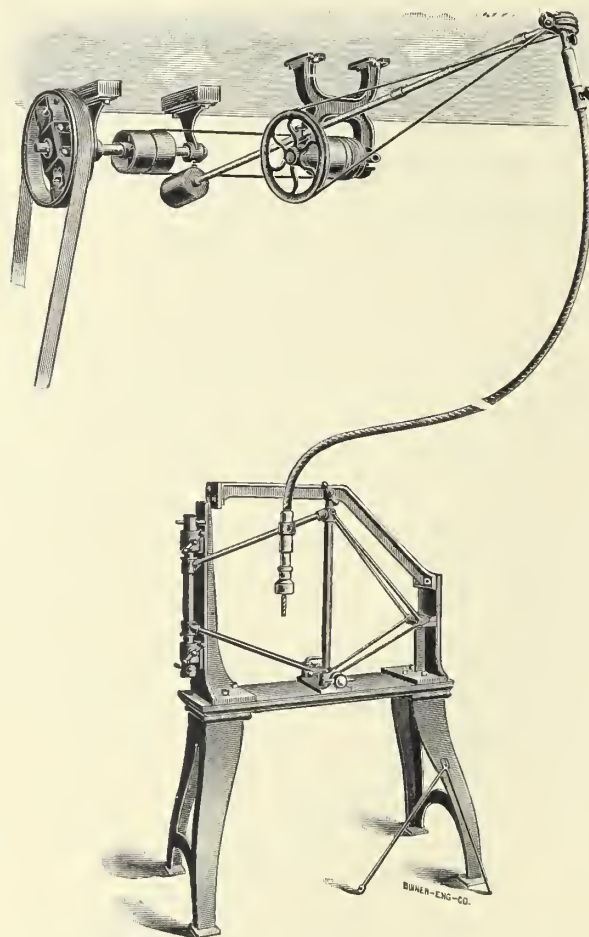
THE PERFECTED RADIAL FLEXIBLE BORING MACHINE.

THIS TOOL has been so long upon the market, that a description at this time seems unnecessary. Since it was first designed it has been continually improved, and we consider it, as the name indicates, as near perfect as it is possible to make it. We would recommend its use by paten makers and wood workers generally. We furnish them in four sizes: No. 3 with wood frame; Nos. 4 and 5 with either wood or iron frame; No. 6 with iron frame only, and at the following prices:

Complete No. 3 machine, with wood frame,	- - - - -	\$66.60
Complete No. 4 machine, with wood frame,	- - - - -	76.60
Complete No. 4 machine, with iron frame,	- - - - -	86.60
Complete No. 5 machine, with wood frame,	- - - - -	87.50
Complete No. 5 machine with iron frame,	- - - - -	97.50

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FIG. 669.



IMPROVED FLEXIBLE BICYCLE DRILL.

THE engraving on this page illustrates a tool which was designed and built for drilling the frames of bicycles for pinning, previous to the brazing operation. The frame is held firmly in a jig, as shown in cut, of which we have patterns and are prepared to furnish.

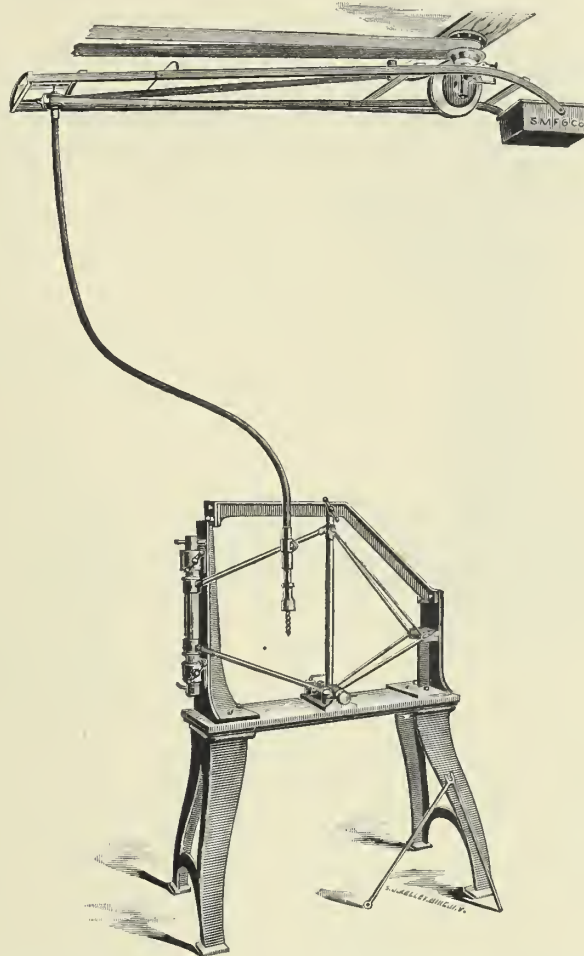
This tool combines the advantage of occupying no floor space—quite a consideration in many crowded factories—is always ready, is very simple, has nothing to get out of repair, and does the work rapidly and economically.

The flexible drill, as will be seen by cut, is suspended from the ceiling, and has balance arm carrying flexible shaft, is counterbalanced by a weight, which insures extensive range, and relieves the operator of all unnecessary weight. The flexible shaft is a No. 3 standard, and is fitted with a serviceable cluck.

The machine has given such splendid satisfaction that we have decided to offer it to the trade in general. We have made the price very low, and cheerfully recommend it to bicycle manufacturers as the correct tool for the purpose.

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FIG. 670.



PERFECTED, RADIAL, FLEXIBLE, BICYCLE DRILL.

MANY bicycle manufacturers in the past have utilized the flexible shaft for drilling bicycle frames with satisfactory results, but the increasing demand has warranted us in devising a special machine for this work. It is, as the cut shows, a modification of the perfected, radial, flexible, boring machine, which, without doubt, is in more general use among carriage manufacturers than any special tool in the market. Briefly stated, it is simple in construction, it hangs from the ceiling, thus occupying no floor space.

The frame has both an up and down and rotary motion. It stops automatically, hence there is no wear on the machine when not in use. It will drill almost anywhere within a circle of nearly twenty feet, so any number of frames that can be placed within this space can be drilled without moving them. It is simple, neat, compact and durable.

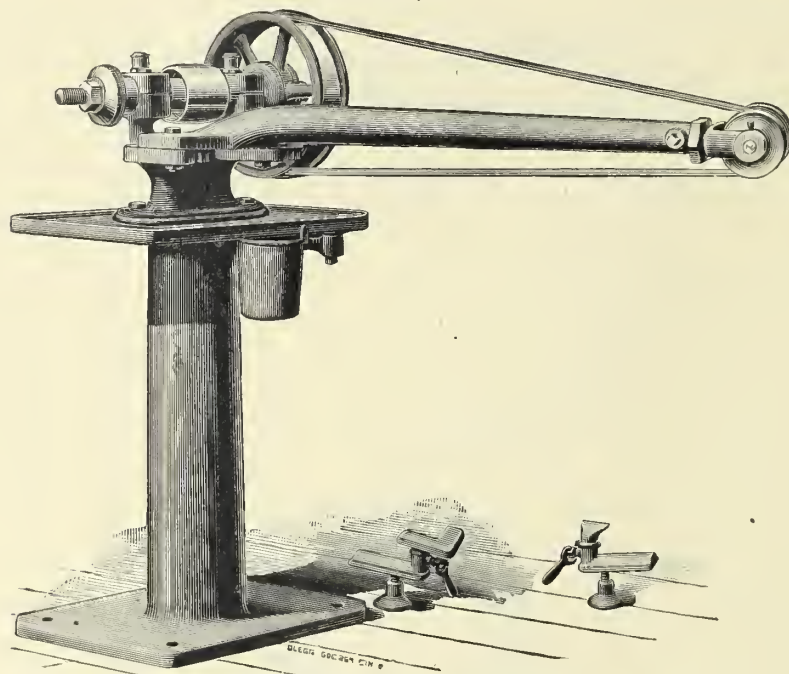
The standard length of flexible shaft furnished with this drill is five feet, but this necessarily varies with the height of ceiling, line shaft, etc. We can furnish shafts of any desired length, and refer you in this connection to page 542, giving prices and capacities of same. No countershaft is necessary with this tool, as it can belt directly from the line shaft.

We should be pleased to furnish prices on application.

Price of machine with chuck taking from 0 to $\frac{1}{2}$ inch,	-	-	-	-	-	-	-	\$66.60
Price of machine with chuck taking from 0 to $\frac{3}{4}$ inch,	-	-	-	-	-	-	-	65.60
Price of machine with chuck taking one size drill,	-	-	-	-	-	-	-	62.85

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FIG 671.



NEW STRAPPING ATTACHMENT.

BICYCLE manufacturers will at once see the advantages of this machine over the old style of strapper with floor support. The bicycle frame can be slipped over the belt and finished on the inside. This part of the frame has formerly been done by hand with file, emery cloth, etc. There being no floor support, the operator slips the frame over the small pulley and tips it in any direction on the belt.

This attachment is suitable for frames, forks or any parts of a bicycle. The belt is quickly removed, or can be tightened to any required tension by a screw. The extending arm is bolted rigidly to the frame of a No. 4 grinder, and is sold as an attachment for the No. 4 machine. This attachment is now in use in several of the largest bicycle factories. It is guaranteed in every particular.

Full description of the No. 4 grinder and column.

No. 4 GRINDER.

Size of wheels in diameter,	-	-	-	-	-	-	-	-	-	12 inches
Length of steel arbor,	-	-	-	-	-	-	-	-	-	22 inches
Distance between wheels,	-	-	-	-	-	-	-	-	-	14 ¹ / ₄ inches
Size of spindle between collars,	-	-	-	-	-	-	-	-	-	1 inch
Size of pulley on arbor,	-	-	-	-	-	-	-	-	-	4 x 3 ³ / ₄ inches
Distance from bench to spindle,	-	-	-	-	-	-	-	-	-	8 ¹ / ₂ inches
Weight, including counter,	-	-	-	-	-	-	-	-	-	145 pounds

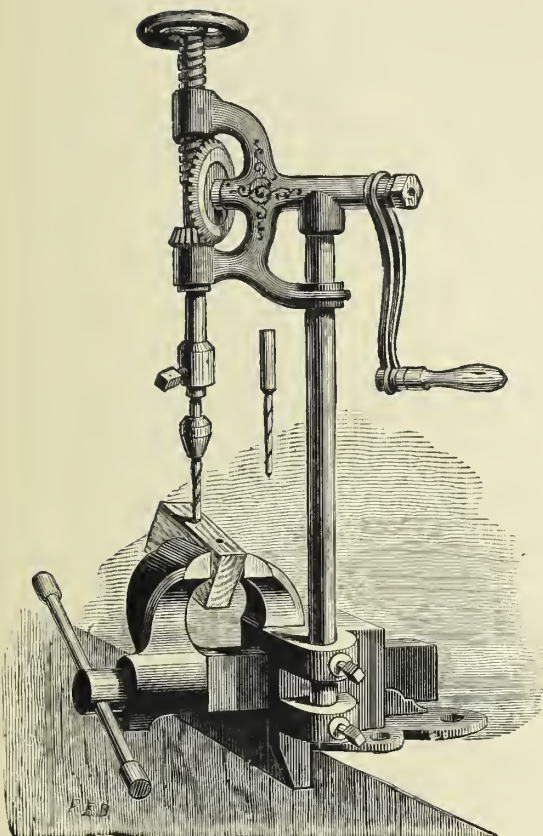
DIMENSIONS IRON COLUMN No. 4.

Size of base,	-	-	-	-	-	-	-	-	-	18 x 22 inches
Size of table,	-	-	-	-	-	-	-	-	-	16 x 20 inches
Height,	-	-	-	-	-	-	-	-	-	24 inches
Weight,	-	-	-	-	-	-	-	-	-	160 pounds

Price, - - - - - \$

PRENTISS TOOL & SUPPLY CO.

FIG. 672.



BREAST DRILL.

Description Fig. No. 674.

This is the largest size drill in the market, the drive wheel being 6 inches in diameter, giving a speed of $4\frac{1}{2}$ to 1. It is double geared and most perfect in every part. It has cut gears, steel stock, rosewood handles, steel jawed chuck, which will hold any size square and round tool shanks. It is heavily nickel plated. Both drill stocks have extra steel jaws for holding small round drills. Price, per dozen, \$48.00.

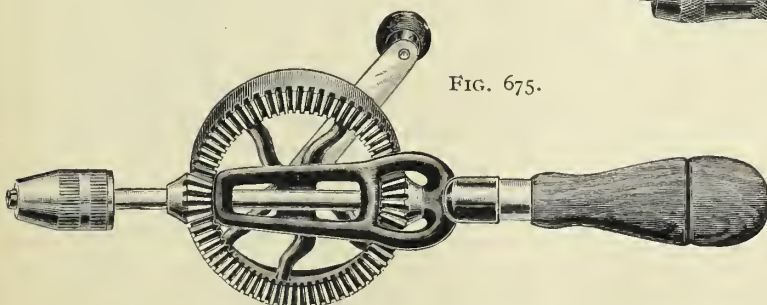


FIG. 675.

20 ounces. With the drill we furnish six points of same style as are put up with our automatic bores. Price, per dozen, \$18.00.

WISE AND DRILL.

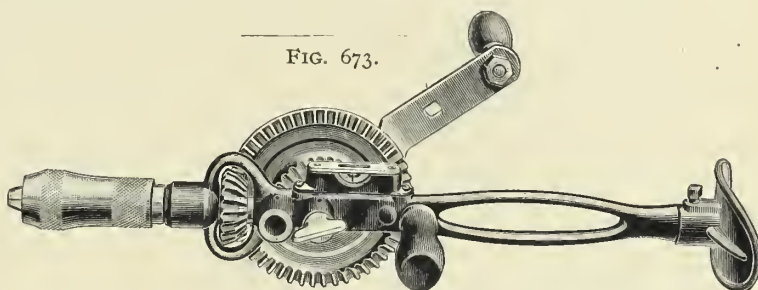
INSERTED STEEL VISE JAWS.

(Description Fig. No. 672.)

The article to be drilled can be held firmly in the vise, so as to be drilled at an angle. A bolt of iron or soft steel can be drilled accurately down through the center, which cannot be done by hand with any other tool. When the drill is sold without the anvil, it is attached to an offset vise, as in Fig. 672. This vise has steel-faced jaws $3\frac{1}{2}$ inches wide, which entirely overhang the screw and the box which covers it. For many purposes this is the most convenient vise in use.

Weight of anvil, vise and drill, 80 pounds,	-	-	-	Price, \$18.00
Weight of anvil, and vise, 60 pounds,	-	-	-	Price, 10.00
Weight of drill press, 20 pounds,	-	-	-	Price, 8.00
Weight of offset vise and drill, 61 pounds,	-	-	-	Price, 15.00
Weight of offset vise alone, 41 pounds,	-	-	-	Price, 7.00

FIG. 673.



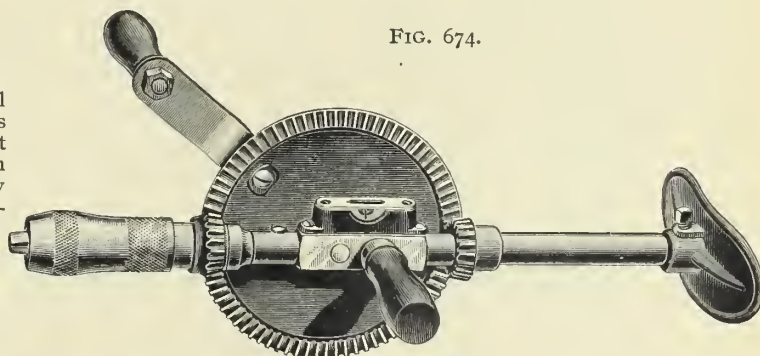
BREAST DRILL.

(Description Fig. No. 673.)

A roller is placed under the large gear wheel, which makes it equal to a double gear. It has a malleable iron stock, japanned, rosewood handles, polished and plated chuck, changeable gears, one even and the other 3 to 1. It has a Barber improved chuck with recent improvement, which makes it hold perfectly tools of all shapes and sizes.

Price, per dozen, - - - \$30.00

FIG. 674.



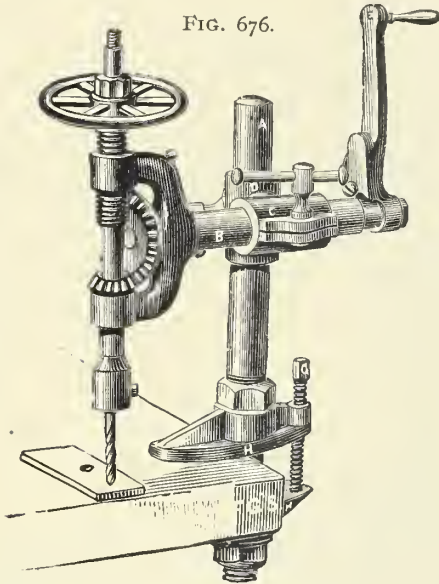
HAND DRILL.

(Description Fig. No. 675.)

The above has all the advantages of drills of this class, and in addition has a wide rimmed gear to be grasped between thumb and fingers when the drill is used for delicate work. In this manner it can be run without liability of breaking points. It is double geared, $11\frac{1}{2}$ inches in length, and weighs

PRENTISS TOOL & SUPPLY CO.

FIG. 676.



IMPROVED PATENT UNIVERSAL ANGULAR AND RATCHET DRILLING MACHINE.

(Description, etc., Fig. 676.)

THESE DRILLING MACHINES are now made of steel, and are first class in all respects. For repair work in mills they are almost indispensable, as they can be attached to a broken machine without taking it apart, and swung around to drill at any angle.

By placing the crank on the drill spindle, it will work with a ratchet or without. We send a chuck with each machine, which will hold $\frac{1}{16}$ to $\frac{1}{4}$ inch drills.

TWIST DRILLS.

We have constantly in stock Twist Drills which we will send by mail, postage paid, upon receipt of price.

One twist drill, $\frac{1}{4}$ inch, with $\frac{1}{2}$ inch shank, is sent with each machine. For $\frac{1}{4}$ inch drills, and all larger sizes, the $\frac{1}{2}$ inch shanks are recommended.

PRICE LIST.

No. 1, weight, 34 pounds.	Drills up to $\frac{3}{8}$ inch hole.	Price, \$20.00
No. 2, weight, 64 pounds.	Drills up to 1 inch hole.	Price, 25.00
No. 3, weight, 108 pounds.	Drills up to $1\frac{1}{2}$ inch hole.	Price, 40.00

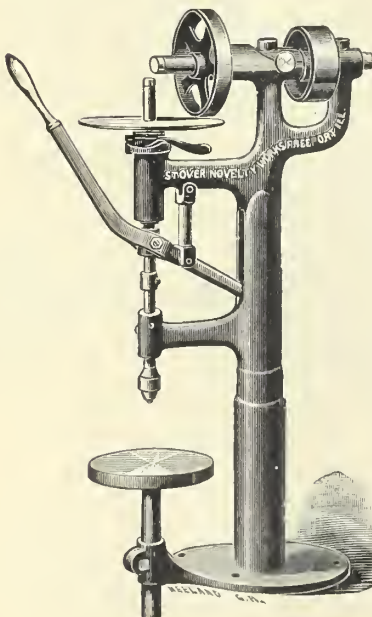
The No. 2 drill has two sets of gears, making either speeded or geared back machine.

No. 4 FRICTION BENCH DRILL.

(Description, etc., Fig. No. 677.)

The accompanying cut represents a small Friction Bench Drill, designed for light work, such as jewelry, electrical, and other light work.

FIG. 677.



CAPACITY AND DIMENSIONS.

It will drill from 0 to $\frac{3}{16}$ inches.

Greatest distance between table and chuck,	$6\frac{1}{2}$ inches
Diameter of table,	6 inches
Distance from center of table to column,	$4\frac{1}{2}$ inches
Diameter of spindle,	$\frac{9}{16}$ inches
Vertical movement of spindle,	$2\frac{1}{4}$ inches
Size of driving pulley,	$1\frac{1}{2} \times 3\frac{1}{2}$ inches
Speed of driving pulley,	800 revolutions
Speed of drills, from	800 to 2000 revolutions
Weight,	35 pounds
Price,	\$25.00
Price, with almond chuck,	30.00

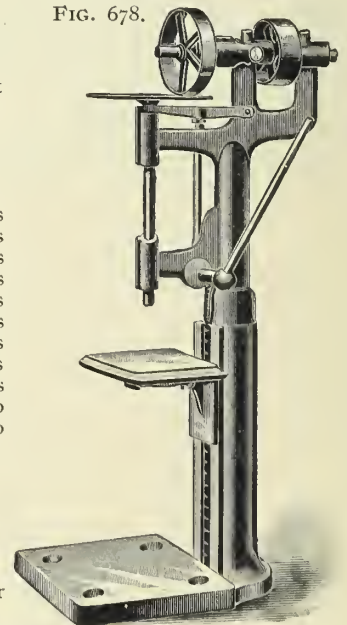
No. 2 FRICTION BENCH DRILL.

CAPACITY AND DIMENSIONS.

It will drill from 0 to $\frac{3}{8}$ inches, and from center of 10 inch circle.

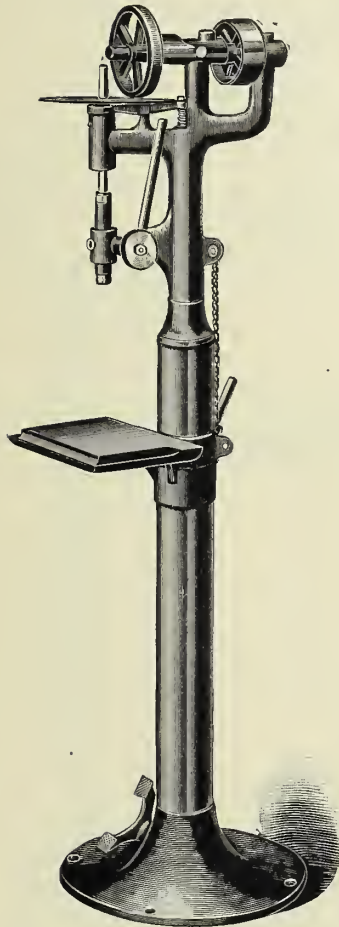
Greatest height from base to spindle,	20 inches
Greatest height from platen to spindle,	13 inches
Distance from column to spindle,	5 inches
Diameter of column,	$3\frac{5}{8}$ inches
Diameter of spindle,	$\frac{3}{4}$ inches
Size of table,	9×11 inches
Speed of driving pulley,	600 revolutions
Speed of drills,	400 to 1500 revolutions
Spindle fitted for No. 1 Morse taper. Weight, 115 pounds. Price, \$32.00.	

FIG. 678.



PRENTISS TOOL & SUPPLY CO.

FIG. 679.



No. 1 FRICTION DRILL.

THE principal feature of this Drill is that power is greatest when speed is slow and large drills are used, and most sensitive for small drills under high speed. The friction plate is always lowered out of contact with the pulley when not in motion, as depressions are made in the leather on pulley when left in contact for any length of time.

This tool has many valuable features, some of which we mention :

The platen is counterbalanced by a weight in column, and can be instantly raised and lowered, also can be swung to either side of column and locked.

It requires about one-third as much belting as other drills.

By a slight motion of the foot it can be quickly started and stopped.

The workmanship throughout is first-class, and the material used is the best that can be obtained.

CAPACITY AND DIMENSIONS.

It will drill from 0 to $\frac{3}{8}$ inches.	
Greatest height from base to spindle, - - -	46 $\frac{1}{2}$ inches
Greatest height from platen to spindle, - - -	35 inches
Distance from column to spindle, - - -	5 inches
Diameter of column, - - - - -	3 $\frac{3}{4}$ inches
Diameter of spindle, - - - - -	$\frac{3}{4}$ inch
Vertical motion of spindle, - - - - -	3 $\frac{1}{2}$ inches
Size of table, - - - - -	10 x 14 inches
Size of driving pulley - - - - -	2 x 5 inches
Speed of driving pulley, - - - - -	600 revolutions
Speed of drills, - - - - -	400 to 1500 revolutions
Spindle fitted for Morse taper - - - - -	No. 1
Weight, - - - - -	160 pounds
Price, - - - - -	\$50.00

No. 2 FRICTION DRILL.

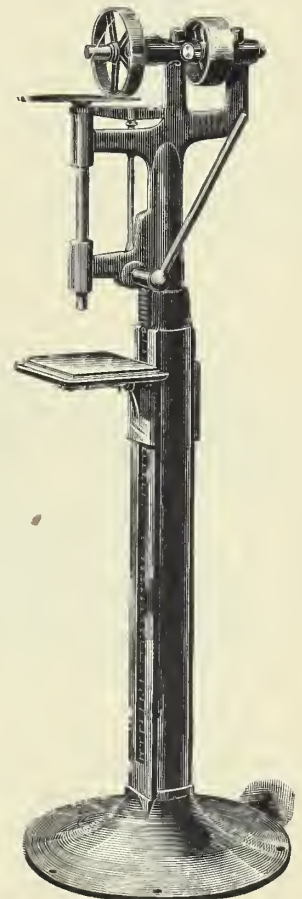
ONE of the great advantages over all other sensitive drills is the power is always in the proper relation to the size of drill used. The resistance of the drill on the work is transmitted through the spindle to the friction plate and pulley. Thus a large drill has greater resistance than a small one, and the driving power is always in the same relation.

This tool is so very simple that it is only necessary to refer to the cut to fully understand it. By a slight motion of the feed or hand lever, it automatically starts and stops. It requires about one-third as much belting as other drills. The platen can be instantly adjusted from one extreme to the other. The workmanship throughout is first-class, and the material used is the best that can be obtained.

CAPACITY AND DIMENSIONS.

It will drill from 0 to $\frac{3}{8}$ inches, and from center of 10 inch circle.	
Greatest height from base to spindle, - - - - -	42 inches
Greatest height from platen to spindle, - - - - -	32 $\frac{1}{2}$ inches
Distance from column to spindle, - - - - -	5 inches
Diameter of column, - - - - -	3 $\frac{3}{4}$ inches
Diameter of spindle, - - - - -	$\frac{7}{8}$ inch
Size of table, - - - - -	9 x 11 inches
Speed of driving pulley, - - - - -	600 revolutions
Speed of drills, - - - - -	400 to 1500 revolutions
Spindle fitted for Morse taper - - - - -	No. 1
Weight, - - - - -	140 pounds
Price, No. 2 Drill, - - - - -	\$40.00

FIG. 680.



PRENTISS TOOL & SUPPLY CO

ASSEMBLING DRILL.

HAS GREATEST POWER WHEN SPEED IS SLOW. IS MOST SENSITIVE WHEN SPEED IS HIGH.

WE offer this machine to the trade, feeling confident that it will supply a long-felt want in the manufacture of bicycles for assembling frames. The machine is so constructed that holes can be drilled in any part of the frame and pinned before being removed from the jig, thus insuring the frame absolutely true.

The jig is bolted to platen, which revolves on the end of the radial arm, thereby enabling the operator to swing the work into any desired position.

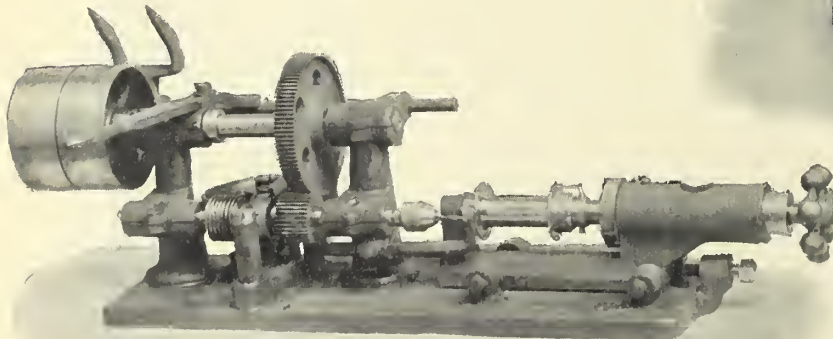
CAPACITY AND DIMENSIONS.

It will drill from 0 to $\frac{3}{8}$ inches.

Greatest height from floor to spindle,	- - -	44 inches
Distance from center of drill to columns,	- - -	22 inches
Diameter of columns,	- - - - -	$3\frac{3}{4}$ inches
Diameter of spindle,	- - - - -	$\frac{3}{4}$ inch
Vertical motion of spindle,	- - - - -	5 inches
Size of table,	- - - - -	$19\frac{1}{2}$ inches
Size of driving pulley,	- - - - -	2 x 5 inches
Speed of driving pulley,	- - - - -	600 revolutions
Spindle fitted for No. 1 Morse taper. Weight,	- - -	325 pounds

Price quoted on application.

FIG. 682.



AUTOMATIC HUB DRILLING MACHINE.

THIS MACHINE automatically drills bicycle hubs without any attention, except to put the hub in and take it out. An ordinary boy can easily drill 25 hubs an hour with a single machine, and can operate two with ease.

The cut is so plain that it needs no further explanation. The hub can be adjusted to any angle for both front and rear hub, so the drill will enter at right angles to the plain of rim. Machine furnished to take in hubs with holes in center from 1 to $1\frac{1}{4}$ inches, and with index ratchet to drill 32 holes, unless otherwise ordered, and accurately spaced intermediate with holes in opposite end of hub. No bicycle manufacturer can afford to be without it. To operate machine, stop the drill upon its return, before the ratchet operates, then put in the hub. No countershaft required.

DIMENSIONS.

Size of driving pulley,	- - -	2 x 5 inches	Weight,	- - - - -	85 pounds
Speed of driving pulley,	- - -	400 revolutions	Price, complete, fitted with chuck,	- - -	\$70.00

FIG. 681.

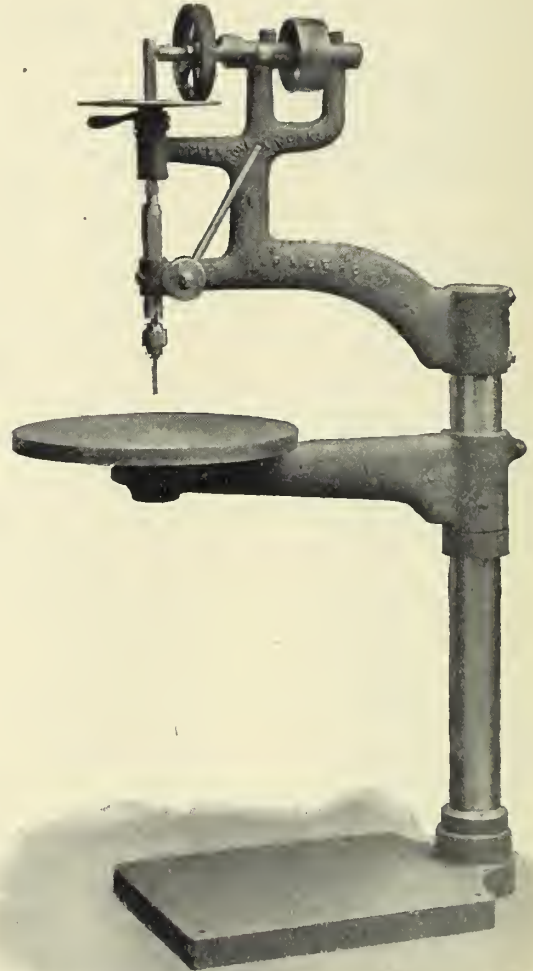
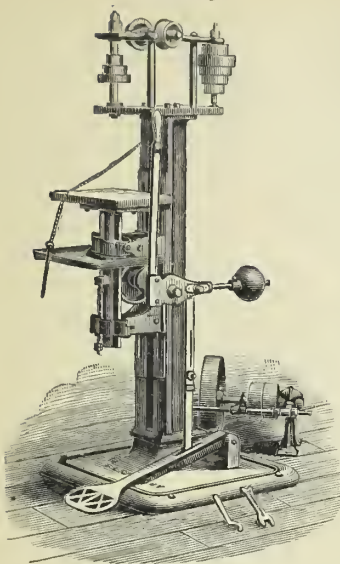


FIG. 683.



No. 1 DRILL PRESS.

THIS MACHINE is designed more for jobbing than for manufacturing, and is fitted up with one or two spindles. Those with two spindles have a cone pulley, allowing two speeds for each spindle. Those fitted up with one spindle have a cone pulley for three speeds. The back shaft has a cone pulley for four speeds. With the above mentioned alterations the press is the same as No. 2 in every particular.

SPECIFICATIONS.

The two-spindle press will drill holes from	-	-	-	-	$\frac{1}{16}$ to $\frac{3}{8}$ inch diameter
The one-spindle press will drill holes from	-	-	-	-	$\frac{1}{16}$ to $\frac{1}{2}$ inch diameter
Size of pulleys on two-spindle,	-	-	-	-	1 $\frac{1}{2}$, 2 $\frac{1}{2}$, 2 and 3 inches x 1 inch face
Size of pulleys on one-spindle,	-	-	-	-	2 $\frac{1}{2}$, 3 $\frac{1}{2}$ and 4 $\frac{1}{2}$ inches x 1 inch face
Size of pulleys on countershaft, tight and loose,	-	-	-	-	6 x $\frac{1}{2}$ inch
Speed of countershaft,	-	-	-	-	180 revolutions
Weight of machine and countershaft,	-	-	-	-	650 pounds
Price of two spindle press,	-	-	-	-	\$160.00
Price of one-spindle press, as shown in cut,	-	-	-	-	150.00

No. 2 DRILL PRESS.

THIS MACHINE has three spindles, and runs at high speed without noise, and is well arranged for light drilling. The spindles are made of steel $\frac{1}{8}$ inch diameter, hardened and ground, and 12 inches long, with taper holes for tool shanks $\frac{1}{2}$ inch diameter and 2 $\frac{1}{2}$ inches deep, with drift-key way to remove the tool from the spindles. The arrangement for the spindles and the adjustment on the column and table are the same as described in Press No. 4. The arrangement for communicating power to the drum is unlike the other machines; it is more simple, and as high speed and little power is required on this press for drilling holes $\frac{1}{16}$ to $\frac{3}{8}$ inch diameter, we believe it is the best; and this opinion is founded on the fact that we have a large number of these machines in use, and they give general satisfaction. The base has a raised rim around its edge for catching oil, etc. The countershaft hangers are adjustable and self-oiling.

SPECIFICATIONS.

Greatest distance from lower end of spindle to table,	-	-	-	-	19 inches
Shortest distance from lower end of spindle to table,	-	-	-	-	4 inches
Length of table,	-	-	-	-	18 inches
Width of table,	-	-	-	-	12 inches
Distance, center to center of spindles,	-	-	-	-	4 $\frac{3}{4}$ inches
Tight and loose pulleys on countershaft,	-	-	-	-	6 and 8 inch x 2 $\frac{1}{2}$ inch face
Speed of countershaft for fast motion,	-	-	-	-	220 revolutions
Speed of countershaft for slow motion,	-	-	-	-	165 revolutions
Weight, complete,	-	-	-	-	700 pounds
Price as shown in cut,	-	\$175.00	Price, with four spindles,	-	\$190.00

FIG. 685.

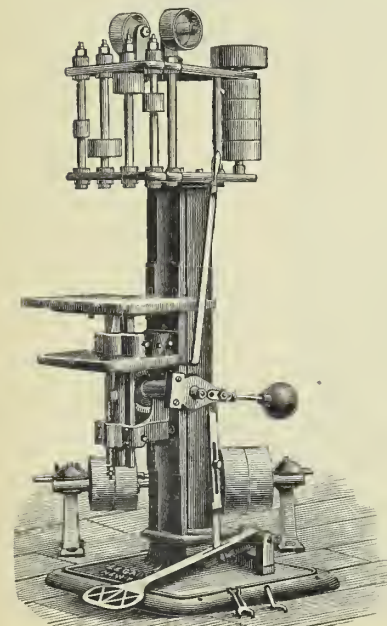
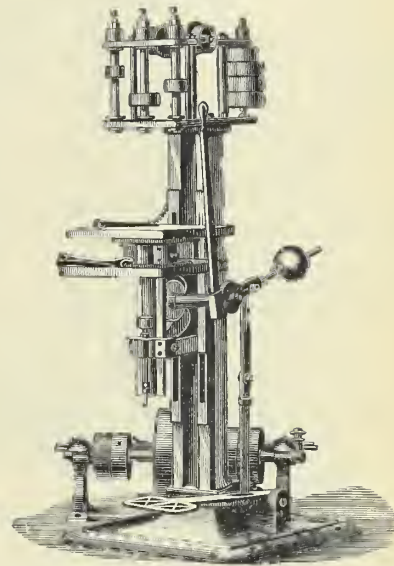


FIG. 684.



No. 3 DRILL PRESS.

THIS PRESS is designed to drill holes from $\frac{1}{16}$ to $\frac{1}{2}$ inch diameter. It runs noiselessly, and has no gearing except the milled rack and pinion for raising and lowering the table. The spindles are $\frac{1}{16}$ inch diameter and hardened and ground, as are also the idler pulley studs. There is a tapered hole in the spindle for receiving the shank of tool which is $\frac{1}{2}$ inch diameter at large end and 2 $\frac{3}{4}$ inches deep, with a mortise for drift-key to remove the tools from the spindle. The upright shaft which carries the drum runs in hardened steel bearings, making this a perfect running press in every particular.

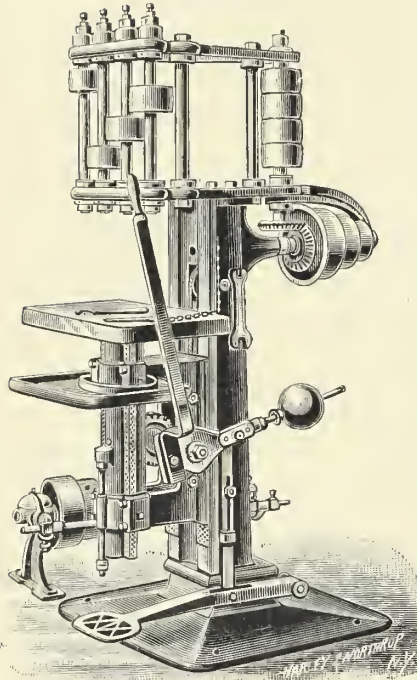
When so ordered, we are prepared to furnish an individual lever movement for the spindles in place of the regular table movement. In this case the table is mounted on a plain knee bolted to the face of the column, but adjustable up and down. The countershaft has two sets of tight and loose pulleys and adjustable self-oiling hangers.

SPECIFICATIONS.

Greatest distance from lower end of spindle to table,	-	-	-	-	18 inches
Shortest distance from lower end of spindle to table,	-	-	-	-	4 inches
Length of table,	-	-	-	-	22 inches
Width of table,	-	-	-	-	14 inches
Distance, center to center of spindles,	-	-	-	-	4 $\frac{3}{8}$ inches
Pulleys on countershaft, tight and loose,	-	-	-	-	8 and 10 x 3 inch face
Countershaft should run on the 8 inch pulley,	-	-	-	-	120 revolutions
Countershaft should run on the 10 inch pulley,	-	-	-	-	90 revolutions
Net weight, complete,	-	-	-	-	850 pounds
Price, as shown,	-	\$250.00	Price, with six spindles,	-	\$290.00

PRENTISS TOOL & SUPPLY CO.

FIG. 686.



No. 4 DRILL PRESS.

THIS MACHINE is very heavy, and designed for drilling holes ranging from $\frac{1}{4}$ to $\frac{7}{8}$ inch diameter; also for counterboring, reaming, face-milling, or any work that is convenient to be done on an upright drilling machine. The spindles are made of steel, $1\frac{5}{16}$ inches diameter and 20 inches long, and are held down by adjustable hardened steel steps at top of frame. The lower end has a taper hole to receive the shank of tools $\frac{3}{4}$ inch diameter and 4 inches deep, with mortise for drift key to remove the tools from the spindle. The spindles run in composition metal boxes fitted up in a very substantial manner, with ample means of adjustment for wear. The table on which the work is placed has hand and foot levers connected by a milled rack and gear to elevate and lower the table, in connection with adjustable stops to limit the exact motion required. The table guide frame is planed to fit the front of the column by tongue and groove guides, so that the whole table and frame, with all the attachments, can be raised or lowered up or down the column by means of a wire cable with a worm and gear, and can be held in a true position at all points. Countershaft has adjustable self-oiling hangers.

SPECIFICATIONS.

Greatest distance from lower end of spindle to the table,	-	20 inches
Shortest distance from lower end of spindle to the table,	-	6 inches
Length of table,	-	26 inches
Width of table,	-	16 inches
Length of spindle,	-	20 inches
Diameter of spindle,	-	$1\frac{5}{16}$ inches
Distance between spindles,	-	5 inches
Pulleys on countershaft, tight and loose,	-	$12 \times 3\frac{1}{2}$ inch face
Speed of countershaft per minute,	-	140 revolutions
Weight of press, with countershaft, about	-	1200 pounds
Price, with countershaft, as shown in cut,	-	\$350.00
Price, with six spindles,	-	400.00

Nos. 3 AND 4 AUTOMATIC FEED DRILL PRESS.

(MADE ONLY TO ORDER.)

THESE MACHINES are the result of the application of gearing to the spindles, and an automatic vertical feed to the tables of the regular drill presses of these two sizes.

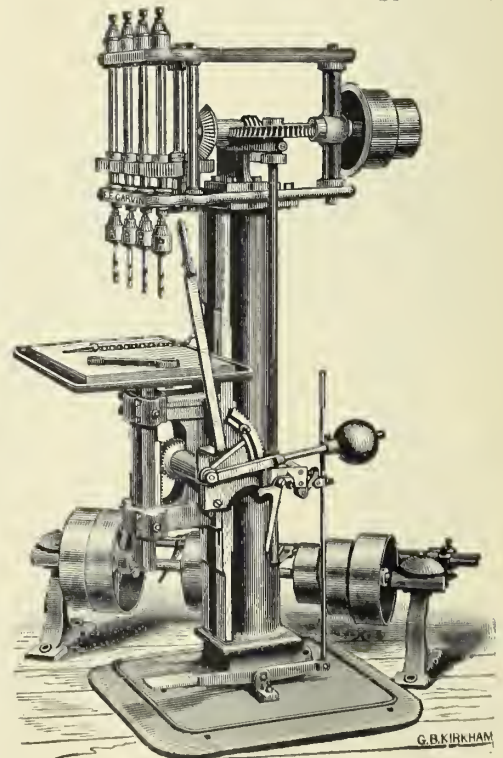
The machines are accordingly more powerful and positive in their action, and on certain classes of manufacturing, where uniformity of work is the important point, are an economical tool. There is an automatic trip for feed, adjustable to any point, and can be readily disengaged by hand.

The lever feed can be employed when desired, without any change of parts.

The capacity of the presses is precisely the same as the regular No. 3 and No. 4 Drill Press.

Price No. 3, as above, \$325.00 net. Price No. 4, as above, \$450.00 net.

FIG. 687.



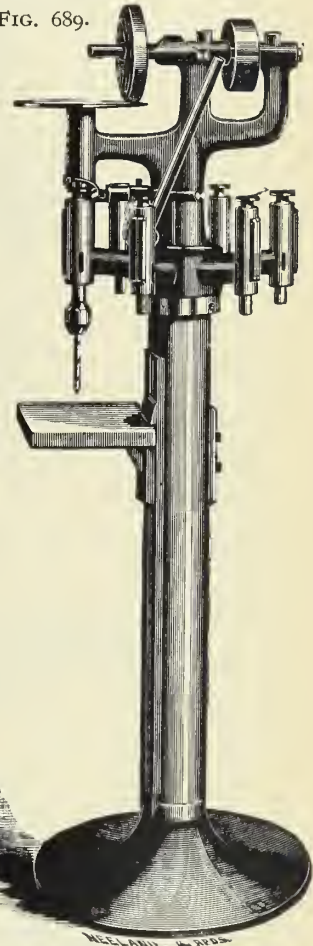
WITH BACK GEARS, POWER FEED AUTOMATIC STOP, WHEEL AND LEVER
FEED COMBINED.

THIS MACHINE is furnished with back gears, power feed, quick return, and automatic stop for determining the depth of holes. Has wheel lever feed combined. It is powerfully geared, and is capable of doing quite heavy work. The table is vertically adjusted on the column by means of a crank in connection with worm and worm gear, which is preferable to a screw, as the table can be swung entirely around the column. The spindle is operated by a worm and worm gear, in connection with a steel rack and pinion, and has the quick return movement common to all drills of this class. The back gearing can be quickly connected or disconnected, by means of the lever descending parallel with the column. This machine was designed to meet the requirements for an all around tool for light or medium class work, and is very convenient to handle. A countershaft with friction pulleys can be furnished when desired for tapping purposes.

SPECIFICATIONS.

FIG. 689.

Diameter of spindle,	-	1½ inches
Vertical traverse of spindle,	-	10 inches
Diameter of table,	-	18½ inches
Vertical traverse of table,	-	15½ inches
Distance from post to center of spindle,	-	10½ inches
Greatest distance from spindle to base,	-	43½ inches
Greatest distance from spindle to table,	-	25 inches
Hole in spindle conforms to Morse No. 3 taper.	-	
Driving pulleys are	-	10 x 2½ inches
Width of belt on cones,	-	2¼ inches
Speed of lower shaft for ordinary work,	-	275 revolutions
Floor space required,	-	52 x 22 inches
Total height,	-	78 inches
Weight,	-	800 pounds



FRICTION TURRET DRILLS.

ONE of the principal features of the Drill is, that power is greatest when speed is slow and large drills are used, and most sensitive for small drills under high speed, a very valuable feature never before obtained in a sensitive drill.

Another great advantage over all other sensitive drills is, the power is always in the proper relation to the size of drill used. The resistance of the drill on the work is transmitted through the spindle to the friction plate and pulley. Thus a large drill has greater resistance than a small one and the driving power is always in the same relation.

The friction plate is always lowered out of contact with the pulley when not in motion, as depressions are made in the leather on pulley when left in contact for any length of time. The pressure of the work coming against the friction plate instead of collar, saves friction and wear. The drill also starts and stops automatically, and is always at rest when not in use.

This tool is so very simple that it is only necessary to refer to the cut to fully understand it.

By a slight motion of the feed or hand lever it automatically starts and stops.

It requires about one-third as much belting as other drills. The platen can be instantly adjusted from one extreme to the other. The workmanship throughout is first-class, and the material used is the best that can be obtained.

CAPACITY AND DIMENSIONS.

It will drill from 0 to ¾ inches and from center of 10 inch circle.

Greatest height from base to spindle,	-	-	-	-	-	-	-	-	-	42 inches
Greatest height from platen to spindle,	-	-	-	-	-	-	-	-	-	32½ inches
Distance from column to spindle	-	-	-	-	-	-	-	-	-	5 inches
Diameter of column,	-	-	-	-	-	-	-	-	-	3¾ inches
Diameter of spindle,	-	-	-	-	-	-	-	-	-	7/8 inches
Size of table,	-	-	-	-	-	-	-	-	-	9 x 11 inches
Speed of driving pulley,	-	-	-	-	-	-	-	-	-	600 revolutions
Speed of drills.	-	-	-	-	-	-	-	-	-	400 to 1500 revolutions

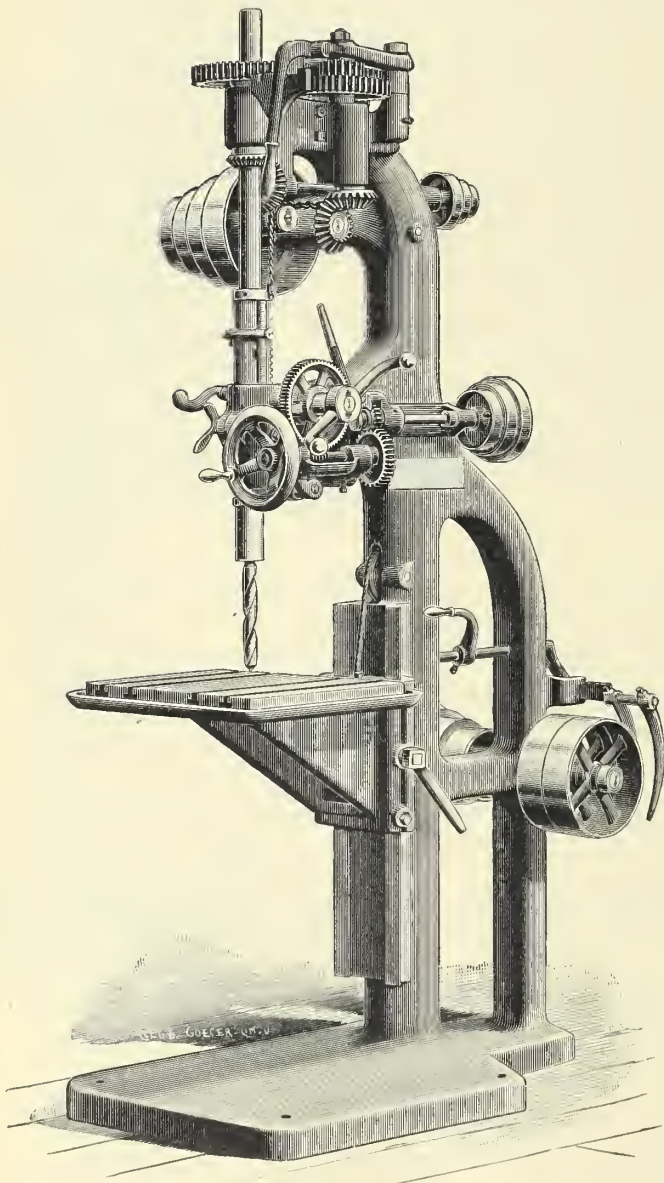
Spindle fitted for No. 1 Morse Taper. Weight, 180 pounds.

Price, No. 6, Spindle Turret Drill,	-	-	-	-	-	-	-	-	-	\$165.00
Price, No. 5, Spindle Turret Drill,	-	-	-	-	-	-	-	-	-	155.00
Price, No. 4, Spindle Turret Drill,	-	-	-	-	-	-	-	-	-	145.00

PRENTISS TOOL & SUPPLY CO.

SPECIAL DRILL FOR MODERN BICYCLE SHOPS.

FIG. 690.



THE cut represents the latest pattern 24 inch Drill, which was designed especially for the rapid accomplishment of work on bicycle parts, and also for the manufacturing of machine parts where jigs are used to accurately drill and ream irregularly placed holes. It is so arranged that two or more drills can be used in a row. The drills can be set 30 inches apart, allowing ample room for changing belts. The countershafts will be parallel with line shaft.

The back gearing can be engaged while the spindle is revolving. The handle by which this is done is within easy reach of the operator. This handle can also be used to stop the spindle revolving.

The feed operated by hand or power, also the quick return and approach motion and the automatic stop are simple, powerful, quick-operating and entirely new. The drill can be instantly engaged, and after the automatic stop has done its duty the drill can be returned without loss of time from unscrewing friction discs, or clutch arrangements. The automatic stopping is done by releasing the worm from the worm-wheel. The worm, which is on a swiveling shaft, is always revolving; it fits exactly in the worm-wheel and can be quickly and easily engaged to same by a conveniently placed hand lever.

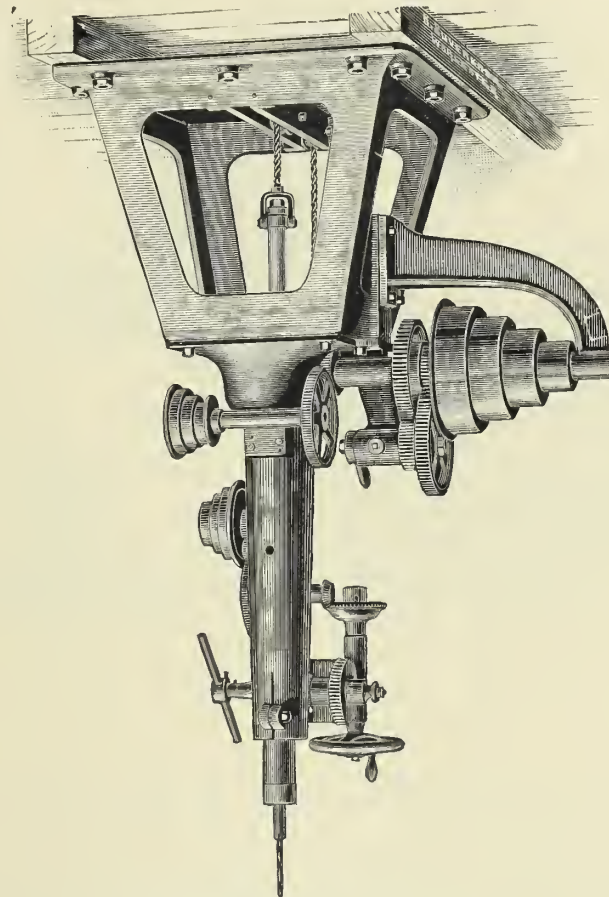
The spindle is counterbalanced and works on anti-friction ball bearings. The table is square; it is arranged with T slots and an oil channel which is tapped for half-inch pipe to drain off the lubricating liquids. It is also counterbalanced, works easily on the column, and can be clamped by tightening the bolt which presses on the V shaped gib.

SPECIFICATIONS.

Size of table, - - - -	18 x 20 inches
Ratio of gearing, - - -	1 to 8½ inches
Vertical adjustment of table, -	16 inches
Diameter of spindle, - - -	1 9/16 inches
Number of Morse taper, - - -	4
Feed of spindle, - - - -	10 inches
Tight and loose pulleys, - -	10 x 3 inches
Speed of countershaft, per minute, 250 revolutions	
Weight, about - - - -	1150 pounds

PRENTISS TOOL & SUPPLY CO.

FIG. 691.



SUSPENSION DRILL.

THIS MACHINE is suspended from the ceiling and fastened thereto or to overhead timbers by coach screws or bolts. There is nothing in this machine to interfere with the swing of any work that may be brought under it. The frame is rigid, in one casting, and needs no truss rods to support it, the spindle is counterbalanced, has hand and power feed, quick return movement, and three changes of feed. Change gears can be furnished to give any required feed, although not shown in cut. This Drill is supplied with a patent device for throwing the back gears in or out. The handle for operating it can be made any desired length, although one is furnished which extends to about the same position as the hand wheel on feed, and can be reached by the operator without the aid of a stepladder. This machine is capable of drilling holes two inches in diameter. Countershaft accompanies this machine.

SPECIFICATIONS.

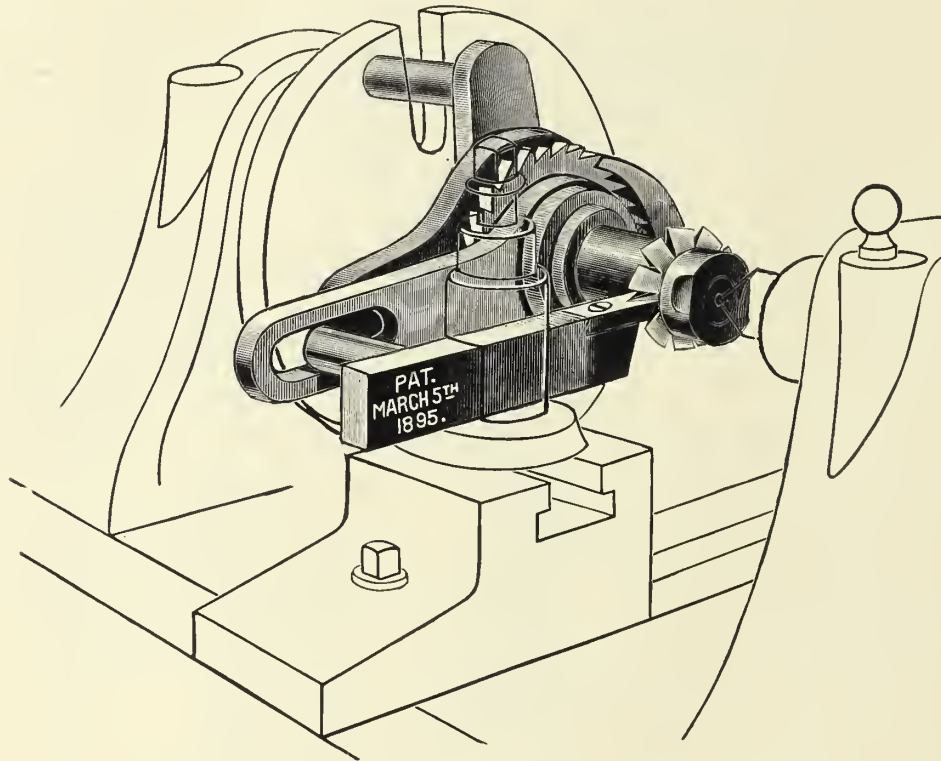
Vertical traverse of spindle,	- - - - -	19 inches
Distance from ceiling to lower end of spindle, when spindle is at its greatest height,	- - - - -	68 inches
Diameter of spindle,	- - - - -	2 inches
Hole in spindle fits Morse taper,	- - - - -	No. 4
Ceiling space required to fasten frame,	- - - - -	36 inches square
Tight and loose pulleys on countershaft,	- - - - - 14 inches diameter by 4 inch face	
Speed of countershaft per minute,	- - - - -	200 revolutions

Weight, 1600 pounds.

Price on application.

PRENTISS TOOL & SUPPLY CO.

FIG. 692.



NEW TOOL FOR BACKING-OFF MILLING CUTTERS.

THIS DEVICE is held in the tool post of a lathe in the ordinary manner, the backing off being such that the cutter can be ground without alteration of shape. The tool is so constructed that it is only necessary to place the cutter upon an arbor in the ordinary way; place the arbor on the lathe centers (of any lathe); start the lathe and feed the tool in by the cross-feed screw in order to take the desired cut, the same as would be done in a plain job of turning.

As the arbor is continuous from end to end of the device, the cutter is held quite rigidly. As this arbor is in precisely the same position upon the lathe centers during the cut upon each tooth, the teeth must be alike.

Does better work in five minutes than can be done by hand labor in five hours. No machine shop can afford to be without this economical and useful tool. Of this tool, the "American Machinist," in its issue of May 30th, 1895, says: "This device we believe to be one of the few really new things in mechanics."

DIRECTIONS FOR OPERATING BACKING-OFF DEVICE.

After turning cutter blanks, and before driving off arbor, rough out the form of cutter with formed cutting tool furnished with device.

To produce a smooth finish, file the forming tool to shape; and, before hardening, take out all the file marks by scraping the cutting edges; harden and temper to a very light straw color. Give cutting tool about 15° clearance.

Mill the required clearance slots in blank; remove from arbor and cut keyway; place cutter on the device and you are ready to proceed. Do not crowd, but take light cuts, and use plenty of good lard oil.

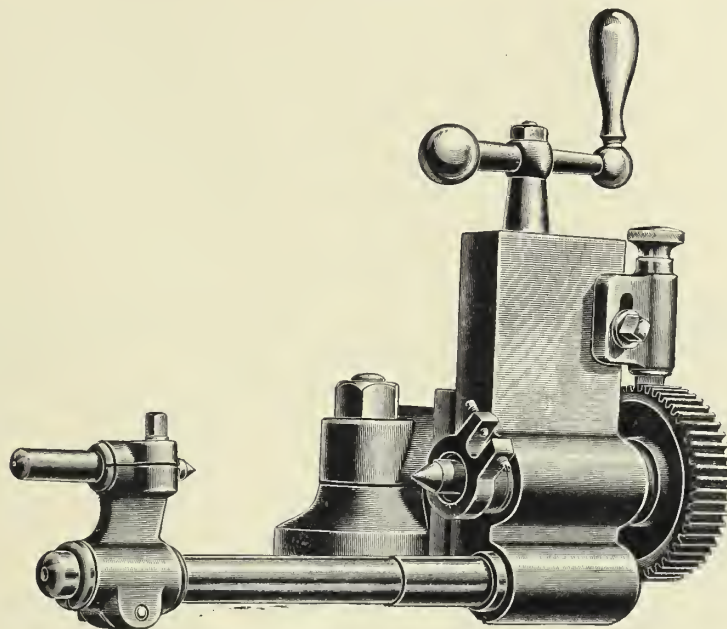
This device will back-off cutters having 9, 12, 18 and 36 teeth by setting pawl to take either 1, 2, 3 or 4 teeth of ratchet at each revolution of the lathe spindle.

Pawl can be set by loosening nut on left side of tool and moving either to or from the center; this will change throw of eccentric.

Under no circumstances attempt to rough out the blank on the tool, or before milling the clearance slots. This device is intended to give the final finish to the form and back it off at the same time. Have your blank well annealed and you will have no trouble in making a first-class cutter. Write for prices and discounts.

PRENTISS TOOL & SUPPLY CO.

FIG. 693.



INDEX MILLING ATTACHMENT.

FOR ENGINE LATHES.

THE fixture shown in the cut, is not only sold at a low price but can be used on any engine lathe or on cut-off slide of screw machine, is a well made and reliable tool and will do all the milling required for a group of screw machines, Monitor or "Fox" lathes, or hand milling machines. It is not expected that this will supersede the expensive milling machines now in use but it is sought to provide a cheap and useful attachment to apply to engine or other lathes, that will enable tool makers to flute taps, reamers, counterbores, etc., make cutters, "slab" bolt or screw heads and do any light milling required in the tool room or small shop. The attachment is held on carriage of lathe in place of tool post, by means of steel bolt furnished and is so constructed that tapering or diagonal cuts can be made, by placing centers in desired position, before clamping down. When in use the arm supporting adjustable back center projects across the lathe on left hand side of carriage, the tool to be milled is held on the centers of the attachment, and the cutter is revolved in the lathe, preferably on an arbor fitted to the taper hole in spindle.

Each machine is fitted with an index plate and they are adapted to use the change gears of lathe on which they are used, the cut shows a gear on in place of index. Index furnished has 48 teeth and will divide for 2, 3, 4, 6, 8, 12, 16, 24 and 48 teeth.

We are not rash enough to claim that this machine will stand up to take a heavy cut with a large mill with coarse teeth, but with ordinary care and properly constructed cutters, it will be found very efficient and will pay for itself in a very short time, as it is simple in operation and easy to apply.

We recommend cutters to be of 1 or 1½ inches in diameter and of rather fine teeth, say 16 to 24 teeth for those sizes. We can furnish cutter arbors fitted to lathe to be used with the attachment, or collect for holding small cutters with shanks, also cutters, special clamp dog, etc. When desired, this machine is furnished with an extra index arbor with "drawing-in spindle," using self-centering spring chucks as supplied by the Faneuil Watch Tool Co. This is much more convenient than dog and center and is much firmer for small work, and has many convenient points that will suggest themselves in use.

PRICES.

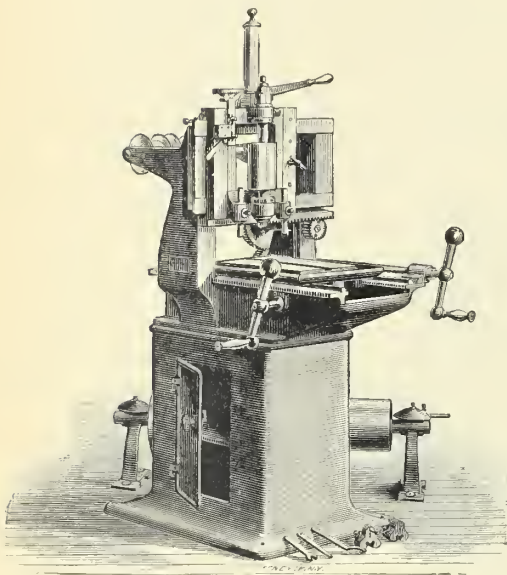
Price of attachment with face plate and center,	-	-	-	\$45.00
Price of attachment with drawing-in spindle in place of center arbor and face plate,	-	-	-	55.00
Price, extra for index arbor with drawing-in spindle and one size chuck,	-	-	-	15.00
Price of cutter arbor, ½ inch,	-	-	-	5.00
Price of collet ½ inch hole,	-	-	-	3.00
Price of 60 degree angular cutter,	-	-	-	2.00
Price of round corner angular cutter for fluting taps and reamers,	-	-	-	2.50
Price of clamp dog,	-	-	-	1.00

The back center and supporting arm is furnished in all cases. The cut is ¼ size. The attachment with centers will mill a tap, reamer or other tool 6½ inches long and 2¾ inches in diameter. Weight, 20 pounds.

PRENTISS TOOL & SUPPLY CO.

SINGLE SPINDLE PROFILING OR EDGING MACHINE.

FIG. 697.



THE cut herewith illustrates our single spindle profiler, which is especially adapted to use as a vertical spindle milling machine, and as the operator has perfect control of the cutter, and the work is always in plain view and quickly handled, the cost and time of producing such work as facing, spotting off, die sinking, key seating, edge milling, milling T-slots, irregular shapes, cam cutting, etc., is greatly reduced. The spindle slide is balanced by spiral spring, and fitted with an adjusting screw with hand wheel graduated in one thousandths of an inch, and a notched stop, providing a quick and accurate adjustment of the cutter to work on different planes. It also has two former pin sockets, so that when the spindle has been employed in cutting a former from a sample piece, the pin may be transferred to the opposite socket and the former used in its original position.

The spindle is driven by one long belt running from the countershaft under sliding idler pulleys, giving a strong and uniform drive.

The movement of the table and cross slide is by rack and pinion operated by balanced handles conveniently placed, provision being made for taking up all wear in the racks and gears, and stops provided for the table and cross slide. Countershaft has friction pulleys giving two speeds.

SPECIFICATIONS.

Floor space required,	- - - - -	24 x 34 inches
Working surface of table,	- - - - -	14 x 10 inches
Movement of table,	- - - - -	18 inches
Movement of cross slide,	- - - - -	11 inches
Distance from table to cross slide,	- - - - -	5½ inches
Diameter of spindle,	- - - - -	1½ inches
Up and down movement,	- - - - -	3½ inches
Friction pulleys on countershaft,	- - - - -	14 x 3 and 8 x 3 inches
Speed of countershaft on 14 inch pulleys,	- - - - -	75 revolutions
Speed of countershaft on 8 inch pulleys,	- - - - -	150 revolutions
Net weight complete,	- - - - -	1425 pounds

SINGLE SPINDLE PROFILING MACHINE,

WITH CIRCULAR TABLE AND POWER FEED.

FIG. 698.

THIS MACHINE is adapted to much wider range of work than the regular profiling machine. The uprights carrying the cross slide, are higher, giving a greater distance between the cross slide and table. The sliding table is larger, has three T slots its full length, and a circular table has been added, having T slots crossing at right angles and arranged to revolve by hand or power, and trip automatically at any point as the work may require.

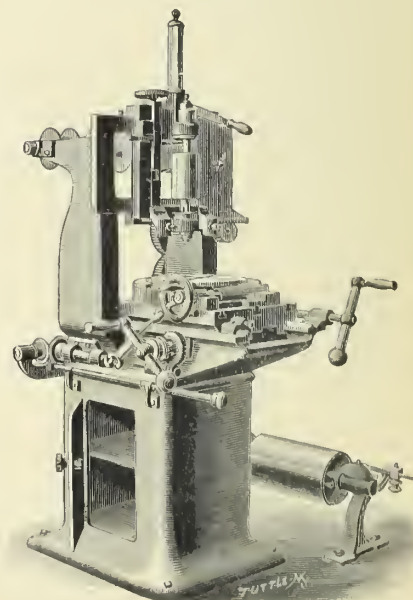
In addition to the usual balanced handles for moving the sliding table, it is also provided with power feed which is thrown in or out by means of a clutch, and the feed of either the sliding or revolving table may be reversed instantly by moving a shipper rod in easy reach of the operator.

The spindle slide is balanced and provided with graduated adjusting screw and stops, giving a quick and accurate adjustment to any height. The spindle is driven by one long belt passing from the countershaft under sliding idler pulleys, insuring a strong and constant motion. Ample means of adjustment for wear are provided in all gears and racks, and stops are provided for sliding table and cross slide. Countershaft has friction pulleys giving two spindle speeds.

SPECIFICATIONS.

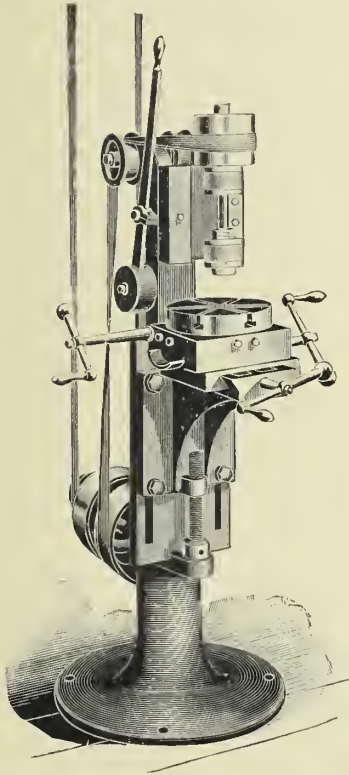
Floor space required,	- - - - -	24 x 34 inches
Size of sliding table,	- - - - -	15¼ x 24 inches
Diameter of circular table,	- - - - -	14¼ inches
From sliding table to cross slide,	- - - - -	10¾ inches
From circular table to cross slide,	- - - - -	7¼ inches
Movement of cross slide,	- - - - -	11 inches
Diameter of spindle,	- - - - -	1½ inches
Up and down movement,	- - - - -	3½ inches
Diameter of circle that can be milled by power,	- - - - -	13 inches

Diameter of circle that can be milled by hand,	- - - - -	28 inches
Friction pulleys on countershaft,	- - - - -	14 x 3 and 8 x inches
Speed of countershaft on 14 inch pulleys,	- - - - -	75 revolutions
Speed of countershaft on 8 inch pulleys,	- - - - -	150 revolutions
Net weight, complete, about	- - - - -	1850 pounds



PRENTISS TOOL & SUPPLY CO.

FIG. 694.



VERTICAL MILLING MACHINE.

(MADE ONLY TO ORDER.)

THIS MACHINE is designed for all that class of milling that is best done with face or butt mills, for which the vertical spindle is specially adapted, as the work and cutter are always in plain view, which makes it very valuable for milling irregular forms and surfaces, as in die making and similar work, as well as plain surface milling, edging, slotting and general machine work. The base and spindle heads are heavy and substantial, and are securely joined by bolts on a broad base. The saddle is gibbed to the top of base, and has a transverse motion, by screw, of 12 inches. The table has a long bearing in the slide block and is fed by a screw.

The spindle has a vertical feed or adjustment of 6 inches, operated by hand wheel, and is provided with an adjustable stop, with screw, for very fine adjusting. It is also provided with a clamp for holding it in any desired position, and is driven by a belt from a three-step cone, which, with the back gearing of five to one, provides six changes of speed. It is also fitted with taper hole for arbors, which are held in place and removed by drawn-in bolt through center of spindle.

We also furnish this machine with power feed, provided with change gears, giving four feed changes, and so arranged as to be instantly reversed by moving a clutch, operated by a lever in easy reach of the operator. Photograph sent on application.

Diameter of spindle,	1 3/4 inches
Distance between table and spindle at highest point,	8 inches
Distance between table and spindle at lowest point,	2 inches
Working surface of table,	12 x 30 inches
Length of automatic feed (when furnished),	18 inches

DIE SINKING MACHINE.

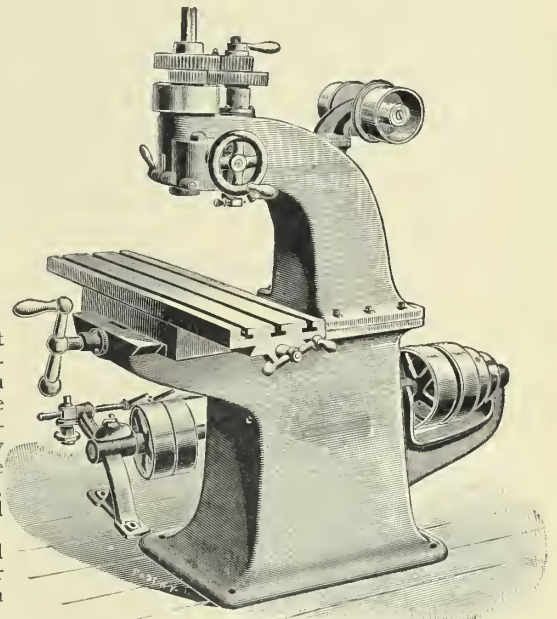
THIS MACHINE is useful for all kinds of light drilling and milling operations, and is invaluable in such specialties as profiling the edges of circular and irregular shaped pieces, and for milling T slots, dovetails, etc.

The spindle has a vertical movement of 4 inches. The table, which is 9 inches in diameter, has horizontally a side movement of 9 inches and a forward of 5 inches, as well as a circular motion; also vertically an adjustment of 6 inches. The spindle-driving pulley is 5 inches in diameter, and is made for a belt 1 1/2 inches wide. The cones are 5, 7 and 9 inches in diameter, and are driven so as to give to the spindle speeds of about 135, 250 and 450 revolutions per minute.

Weight, 650 pounds.

Price with countershaft, \$300.00

FIG. 695.

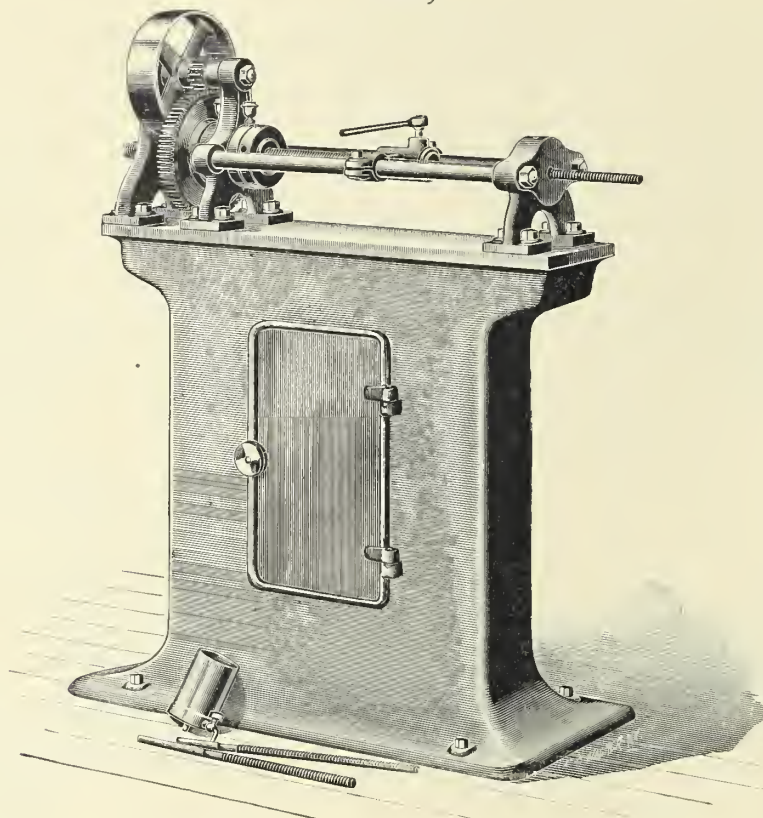


SPECIFICATIONS.

In and out adjustment,	12 inches
Length of bearing in slide-block,	19 inches
Dimensions of driving pulley on spindle,	8 1/2 x 3 1/2 inches
Net weight, complete,	1500 pounds
Price without power feed, net,	\$450.00
Price with power feed, net,	550.00

PRENTISS TOOL & SUPPLY CO.

FIG. 696.



No. 1 BROACHING MACHINE.

THE cut shows a tool especially designed for broaching out small, irregular shaped holes in iron and steel, and is a very simple and substantial machine for that purpose. It will be found extremely useful in producing broached work for bicycles, guns, sewing machines, and in fact wherever irregular holes that are true to gauge are desired.

Operation.—In this machine the broaching tool is drawn through the work instead of pressed, thus permitting the use of a long cutting bar, reducing the wear of the same, and often producing the finished work at a single operation.

Finishing Broach.—In some cases the use of a second or finishing tool is to be recommended ; especially where a large number of holes must be exactly similar. By the use of our broaching bit, for which patent is pending, there can be no jamming or crowding due to the dulling of the broach, and work produced by these tools is necessarily in the same position relative to the other parts of the piece operated upon.

Manipulation.—The manipulation of the machine is extremely simple ; and the time of the operation is very small, the speed of the broaching cut being as high as the cutting bar will stand. It can be successfully operated by boys, and the production of work within its range will be found rapid and completely satisfactory.

Countershaft.—We furnish with the tool a countershaft with friction pulleys, permitting a rapid backward movement of the broach. The pulleys are for a 3 inch belt, and the proper speed will be furnished, depending upon the character of the work. We also furnish the necessary wrenches, oil cans and receptacles. We are prepared to furnish this machine in larger sizes for the production of broached work of all classes and solicit correspondence concerning the same.

PRENTISS TOOL & SUPPLY CO.

IMPROVED GEAR-CUTTING MACHINE.

THIS MACHINE is simple, strong and compact, and is designed for the use of cotton factories, tool and general machine and repair shops. It will perform all classes of gear cutting with great accuracy and dispatch.

It occupies a floor space of 24 by 48 inches, and weighs when ready for shipment about 900 pounds.

It will cut every number to 100, every even number to 186, and has a very wide range of higher numbers.

It is furnished with all necessary change wheels, tables of division, wrenches, etc., one blank arbor, with nut for withdrawing same, and an adjustable rim rest.

It will cut spur, bevel, and worm wheels to 32 inches diameter by 8 inches face, of 6 diametral pitch and less, in steel, iron, brass or wood, and is remarkably effective on all sizes under 15 inches.

It may be accurately set at any desired angle for bevel gears by a nicely graduated arc, and has a graduated adjustment either side of the vertical, so that it may be easily set for cutting wheels to be operated by worms of almost any pitch; also for trimming the sides of bevel gear teeth, when set over at any angle. The cutter may be adjusted to the center, or $\frac{1}{2}$ inch either side if desired.

The cutter is fed through the blank by hand, as shown, a method necessary by reason of the low price of the machine, and also one by which the largest amount of work (particularly of light work) may be accomplished.

The countershaft should make about 275 revolutions. Pulleys are 7 inches diameter by $2\frac{3}{4}$ inch face.

The machine is delivered f.o.b. at New London, Conn., on skids for shipment, upon receipt of order, if practicable.

This machine is thoroughly well made throughout, and is a complete and very convenient machine, with all the adjustments required in modern practice, and has given excellent satisfaction wherever used.

We shall be pleased to answer more explicitly all inquiries.

Price, complete in all respects, \$275.00. Boxing extra.

FIG. 699.

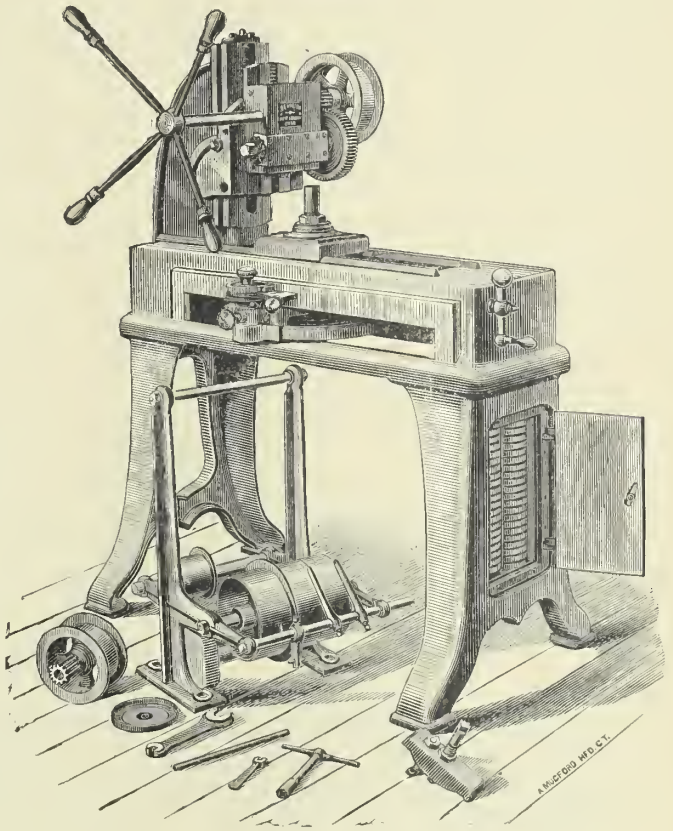
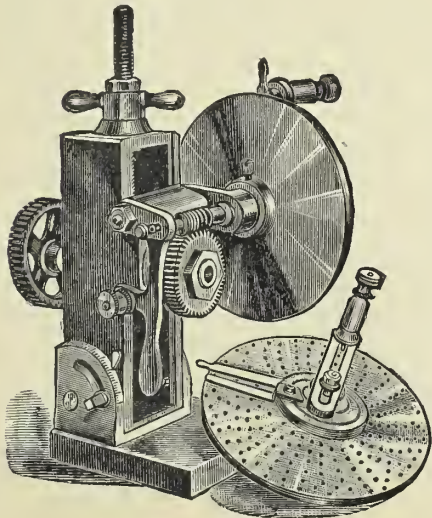


FIG. 700.



GEAR CUTTING ATTACHMENT FOR ENGINE LATHES.

THIS ATTACHMENT is designed to be used on any screw cutting lathe. For any one having use for small spur, bevel, or mitre gears, in quantities that will not warrant the purchase of a large gear cutting machine, this attachment is indispensable and will often pay for itself.

The blank to be cut is held on a mandrel fitting a taper socket in the spindle of the sliding head, and is revolved by a steel worm working in a cast iron gear connected with the dials.

The cutters are held on a mandrel between the centers of the lathe, the cross feed screw of the lathe being used to feed the work over the cutters.

The spindle has a vertical adjustment of 4 inches, and the diameter of the gear which can be cut depends upon the swing of the lathe.

It can be used for a great variety of work, such as fluting taps and reamers, making milling cutters or any work that can be done on an index milling machine.

Two dial plates giving 133 changes and dividing all numbers to 50, and all even numbers to 100, together with a great variety of other divisions are furnished with each machine.

Price, - - - - - \$30.00

PRENTISS TOOL & SUPPLY CO.

A NEW AUTOMATIC GEAR CUTTING AND HOBGING MACHINE.

A UNIVERSAL MACHINE ADAPTED FOR CUTTING SPUR AND BEVEL GEARS, AND WORM GEARS BY THE HOBGING PROCESS FROM BLANKS NOT PREVIOUSLY NICKED.

MECHANICAL DESCRIPTION.

THE general design of the machine illustrated is the most satisfactory for a wide variety of the ordinary work for which this tool is particularly adapted. The blanks are mounted upon a vertical work spindle, and the cutter carriage slides in a vertical or inclined path as required. Both the cutter and the work performed may be readily inspected at any point in the cutter travel. The work spindle is adjusted toward or from the cutter to accommodate variations in diameter, and clamped at the desired point. It is hollow and of such shape that chucks or special fixtures for holding the work may be readily fitted. The frame is a single rigid casting, very heavy in all cross sections, and accurately finished. All the details of the machine have received careful study, the parts being well proportioned, and having the largest possible wearing surfaces.

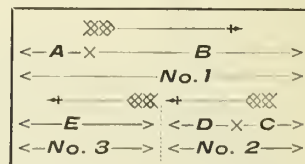
Cutter Driving Mechanism.—Power is conveyed from the fixed driving shaft through mitre gears, a sliding splined shaft, and bevel gearing, pivoted in the cutter carriage concentric with the cutter spindle. A sliding yoke holds the journals of the splined shaft in perfect alligment, relieving them of all side thrust. The connections are such as to accommodate any possible position of the cutter carriage. The cutter spindle is mounted in a transversely sliding box, which may be adjusted as required in setting the various cutters to coincide with the center of the dividing spindle.

Feeding or Sliding Mechanism.—The cutter carriage or slider is moved by a feed screw mounted in the cutter support. This feed screw is driven from the pivotal shaft, about the bushings for which the cutter supporting frame may be adjusted at any required angle, one of the side arcs being graduated for this purpose. After setting, this support may be clamped rigidly at the necessary angle for bevel gear cutting. The pivotal shaft is driven through spiral gearing by a splined vertical shaft accommodating any desired vertical position of the head, this vertical shaft in turn being driven by a horizontal shaft mounted in the frame of the machine. The direction of movement of the cutter carriage is controlled by a sliding clutch upon this horizontal shaft, the quick return movement being at a constant velocity, while the feed may be varied widely by the use of such change gears as may be found best in practice. The horizontal driving shaft is also provided with an independent clutch controlled by the hand lever shown at the front of the machine, by means of which the feed mechanism may be connected or disconnected, as desired. The sliding or reversing clutch may also be moved to the central position, out of engagement with either of its drivers, whenever required. With the sliding clutch in this neutral position, or the feed mechanism disconnected by the cut-off clutch referred to, the cutter carriage may be moved in either direction by hand, by applying the crank handle to the projecting end of the pivotal shaft. The machine may be conveniently fed by hand, if desired, in setting for depth of cut, etc.

Clutch Sliding or Reversing Mechanism.—The clutch through which the feed shaft is driven in either direction is moved mechanically into contact with its opposite drivers. By so controlling its action, the successive steps in the operation of the machine are made to depend upon the completion of all previous movements. The clutch movements are accomplished by a rock shaft, gear segment, and a rack on the clutch slider, and are illustrated in the accompanying diagram, in which movements *A* and *B* are in a direction to engage with the quick return driver, and movements *C*, *D* and *E* in a direction to engage with the feeding driver. Assuming the sliding clutch to be in engagement with the feeding driver, the cutter slider will be fed forward until it contacts with the lower stop, which will be moved with the slider so long as the clutch remains in engagement with its driver. The arrangement of the stop-rods and levers is such that this movement of the stop-rod in the direction of the feed will withdraw the clutch from its driver. This action gives the sliding clutch its movement *A*, and ceases when the clutch faces are disengaged. It also releases the clutch sliding mechanism, which gives the clutch its further movement *B*, causing engagement of the opposite clutch faces and reversing the feed screw.

Contact of the cutter slider with the upper stop causes similar action, the motion of the stop-rod giving the clutch its movement *C* out of engagement with its driver, and releasing mechanism producing movement *D*, leaving the clutch in the central position and the feed screw at rest. The clutch sliding mechanism is so designed that the combined movements *C* and *D*, (or No. 2) are about one-half of *A* and *B* (or No. 1) leaving *E* (or No. 3) which again engages the feed, to be caused by the completion of the spacing action.

Spacing Mechanism.—The required divisions are accomplished by a worm gear, worm, and suitable change wheels. The worm gear is divided in the center, and the parts are hobbed successively in different positions until practical accuracy is attained. Suitable provision is made for taking up any wear which may occur between the worm and worm gear.



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The spacing mechanism is driven at the proper time by a positive clutch which does not require adjustment or consume power when not in action. It is started and stopped by a notched disc within the spacing box, moved through a pawl and ratchet connection by the rock shaft which controls the reversing clutch. Referring to the clutch diagram, the No. 1 movement of the rock shaft and clutch serves to move the pawl only, but movement No. 2 carries the stop disc with it and releases the spacing mechanism, which acts immediately upon the completion of that movement. The initial spacing shaft may then revolve continuously unless interrupted by a further movement of the stop disc. This is effected by a cam shaft geared to the initial spacing shaft and bearing a cam which gives the rock shaft its movement No. 3, moving the stop disc to a position which disengages the spacing clutch, and engages the feeding mechanism. When not in revolution the initial spacing shaft is firmly locked by a substantial bolt.

Cone gearing between the initial shaft and the cam shaft is provided so that the number of initial revolutions to be allowed before the cam shall act to stop them, may be varied as required.

The gear train which connects the spacing clutch driver and the driving shaft is made of the same ratio as that connecting the driving shaft and the cutter spindle, so that the spacing shaft and cutter revolve in unison. A hand lever is provided by which the initial spacing shaft may be started, independently of the rock shaft and reversing clutch action, so that continuous revolution of this spacing shaft in unison with the cutter, may be availed of to automatically cut worm gears by the Hobbing process.

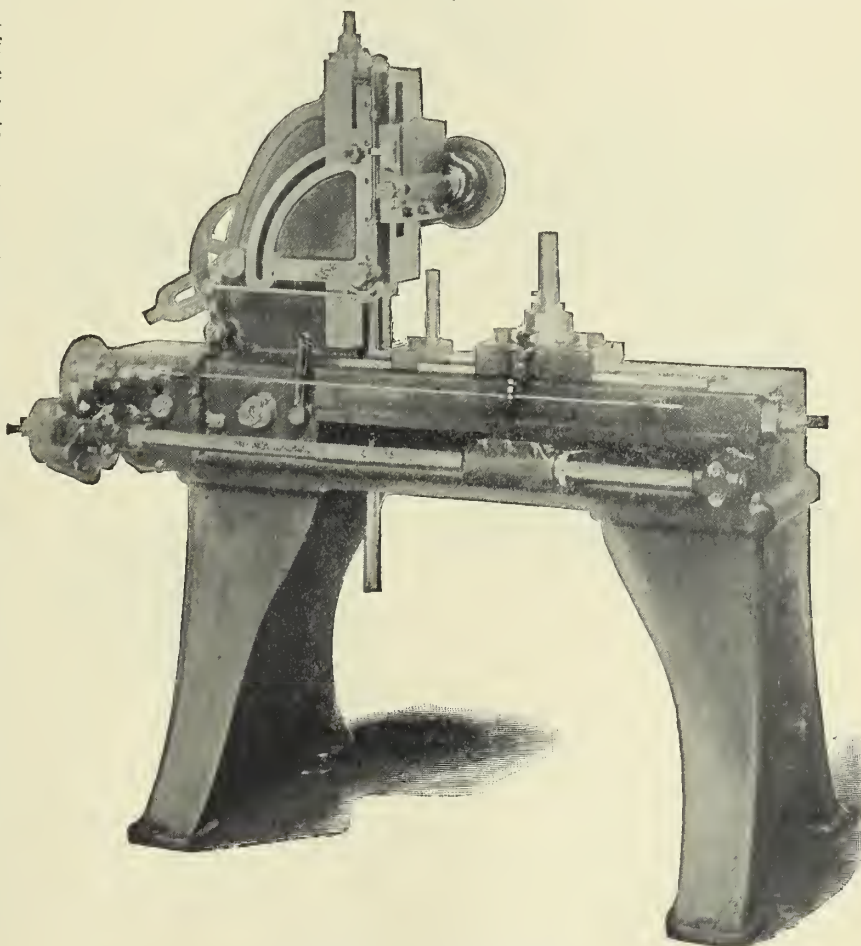
The driving gear of the spacing train is mounted on an adjustable clamp coupling provided with a graduated ring, so arranged that by releasing the clamping bolts the worm shaft and spacing train may be revolved independently of the spacing shaft, the amount of such movement being easily registered by the graduated ring. This arrangement provides convenient means for setting the blank for the second cut in bevel gear work.

Stop Motion and Alarm Mechanism.

—The dividing or work spindle is provided with an adjustable graduated collar, having a notch into which, in one position, a spring pressed plunger may advance. This plunger is connected by suitable mechanism with a ratchet guard in the spacing box, which, when the plunger is advanced, will prevent the engagement of the pawl and ratchet of the spacing mechanism above referred to, so that the No. 2 movement of the rock shaft will not move the stop disc, and spacing will not occur. The graduated spindle collar may be set so that the plunger will advance upon the completion of the whole, or of any desired part of a revolution of the work spindle. The movement of the plunger and its connections also moves a bell hammer into

the path of a cam, so that upon the completion of the desired series of gear teeth a continuous alarm is rung. A clamping screw is provided, by means of which the alarm mechanism may be prevented from acting, if desired.

FIG. 701.



MACHINE No. 1.—FRONT VIEW.

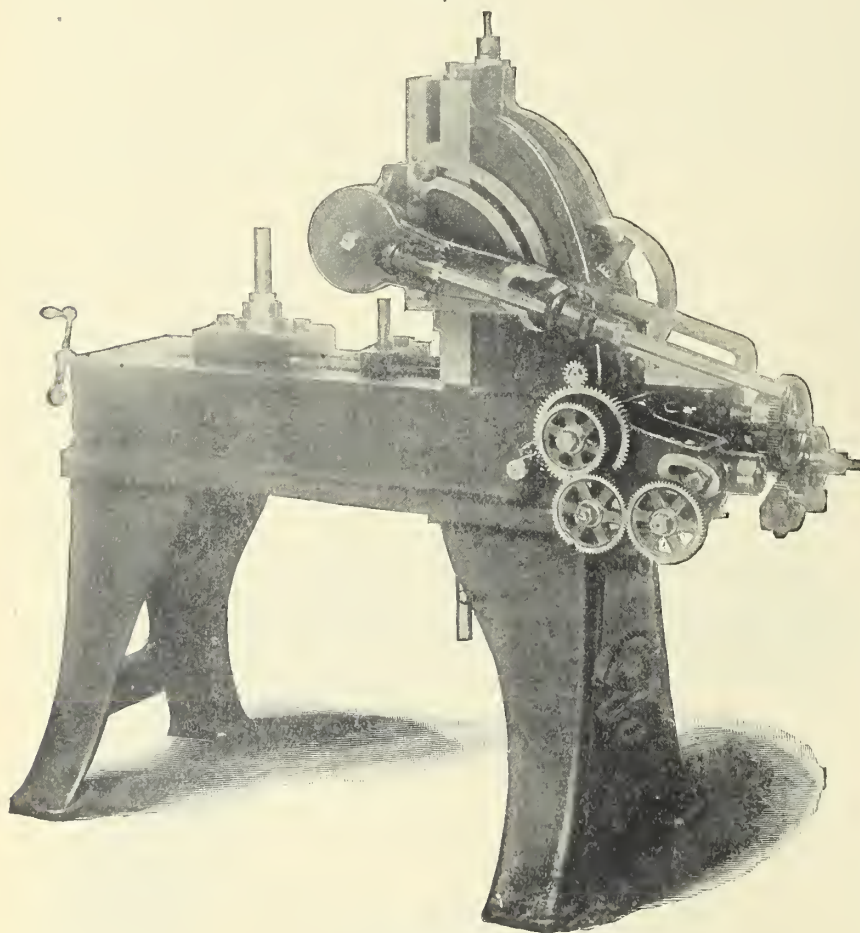
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Convenience.—Special study has been given to the convenient arrangement and accessibility of all parts requiring adjustment in setting the machine.

The traversing screws have graduated dials reading to thousandths, enabling depths of cut and other movements to be accurately determined.

The adjustment of the cutter to the center of the dividing spindle is easily effected, and a gauge by which to set same is furnished. The sliding box in which the spindle is journaled has a movement of about $\frac{1}{2}$ inch either side of the center.

FIG. 702.



No. 1 MACHINE.—REAR VIEW.

The change gears are stored each in its own numbered compartment, and an index table giving the changes is conveniently mounted. Any person familiar with a thread cutting lathe can easily set the change gears for any number of teeth, and mistakes in dividing are impossible when the machine is properly set.

A movement of the starting lever will allow the work spindle to revolve continuously, if desired, for testing the truth of blanks, etc. The continuous revolution of the blank may be stopped at any time by moving another lever, and the blank will stop exactly on some multiple of the space for which the machine is set.

The worm shaft is fitted to receive the crank handle, and by disconnecting the spacing gear train, the blank may be revolved by hand in testing, if preferred, or to set it accurately in any desired position, as for cutting out a small blow hole.

The stop collar on the upper end of the work spindle is graduated in degrees, and registers the angular movement of the blank at each spacing. A reading from this collar affords a convenient check upon the accurate setting of the change gears for the required number of teeth. The collar may be set to operate the stop motion and alarm mechanism after any desired number of degrees have been spaced.

The stop-rod connections are very convenient and easily adapted to any position of the head, it being only necessary to clamp the rods after the position of the head has been determined, when an adjustment of the stop collars for the desired length of stroke is all that is necessary.

The cutter carriage may be moved to any position without disturbing the collars, a convenient movement of the dog which contacts with these stops enabling it to pass them freely, and permitting hand movements, if desired, as in setting for depth of cut, changing blanks, etc.

The range of feed is very wide, as any combination (either simple or compound) of the forty-five change gears may be readily made. A table giving the feed per revolution of cutter, and per minute, which results from certain combinations, is provided, serving as an approximate guide for setting the gears.

The feed may be thrown out at any time, the cutter withdrawn from the cut and removed if necessary, as for grinding, and returned again to the same position for continued work, without disturbing any adjustment.

The automatic feeding and reversing mechanism may be disconnected from the feed screw by the movement of a lever, whenever desired.

In bevel gear cutting very convenient means are provided for giving the blank the necessary set over for the second cut, as explained above (under spacing mechanism), and also for the transverse setting of the cutter.

The machine may be set to automatically give divisions of ninety degrees or less, making it convenient for finishing square or hexagonal nuts, or similar work.

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Its design renders the use of special attachments for unusual work, such as index drilling, internal gear cutting, rack cutting, work upon centers, etc., very convenient. We are prepared to adapt it for any such work, and solicit correspondence in this line.

Size No. 1.—This machine will cut spur and bevel gears to 5 diametral pitch, 34 inches diameter and 7 inch face, and worm gears by the Hobbing process from blanks not previously nicked. The spindle is fitted to receive standard trade cutters having $\frac{7}{8}$ inch hole. Cutters with larger holes can be mounted by means of suitable bushings. The machine will divide for all numbers from 4 to 100, all even numbers and many others to 200, and a wide range of higher numbers. The countershaft gives a number of speed changes, and has a 10 inch pulley for 3 inch driving belt. It should make about 280 revolutions per minute. The net weight of the machine is about 1500 pounds. Gross weight ready for shipment about 1700 pounds. Floor space, 28 inches by 59 inches.

Price, \$. It includes complete over head works, all necessary wrenches, gauge for setting cutters central, change gears, index and feed tables, etc. Cutters and work arbors are not included. Price on these will be quoted upon application. Tight boxing for sea shipment \$10.00 net extra. Dimensions of box, 30 inches wide, 63 inches long, 62 inches high. Gross weight, about 1750 pounds.

Size No. 2.—Similar in general design to the No. 1 machine, but for spur and worm gears only. Frame, and nearly all details same as the No. 1. Design modified only by the omission of the bevel gear adjustment. This machine will cut spur gears to 5 diametral pitch, 36 inches diameter and 8 inch face, and worm gears by the Hobbing process from blanks not previously nicked. Other details, same as the No. 1 machine.

Price, \$. It includes complete overhead works, all necessary wrenches, gauge for setting cutter central, change gears, index and feed tables, etc. Cutters and work arbors are not included. Price on these will be quoted upon application. Boxing for sea shipment, extra, same as for the No. 1 machine.

Size No. 3.—Similar in general design to the No. 1 machine, but for spur and worm gears only. Frame and many details same as the No. 1. Design modified by the omission of the bevel gear adjustment and the use of a much heavier and more powerfully geared cutter spindle. This machine will cut spur gears to 3 diametral pitch, 36 inches in diameter and 8 inch face, and worm gears by the Hobbing process from blanks not previously nicked.

The spindle is fitted to receive special cutters having $1\frac{1}{4}$ inch holes, and is powerfully driven by worm gearing running in oil. The machine will divide for all numbers from 4 to 100, all even numbers and many others to 200, and a wide range of higher numbers. The countershaft gives a number of speed changes, and has a 6 inch pulley for 3 inch driving belt. It should make about 620 revolutions per minute. The net weight and floor space about the same as the No. 1 machine.

Price, \$. It includes complete overhead works, all necessary wrenches, gauge for setting cutters central, change gears, index and feed tables. Cutters and work arbors are not included. Price on these will be quoted upon application. Boxing for sea shipment, extra, as for the No. 1 machine.

Attachments.—There is a large class of work, such as chuck and other pinions, made solid on their shafts, which it is necessary to cut upon centers. The center attachment is particularly designed to receive this work, and will greatly relieve the universal milling machine, besides reducing the cost of production. Solid pinions, either spur or bevel may be cut automatically, and solid worm gears of twelve or more teeth may be hobbled from the turned blanks, without previous nicking, while mounted between centers upon this attachment.

The regular attachment for the No. 1 machine will swing 7 inches and will take 16 inches between centers. The dividing spindle is connected with the main work spindle of the machine by mitre gears. It is hollow, having a hole $1\frac{5}{8}$ inches in diameter, and is threaded to receive a chuck for holding long work. Variations in the design may be readily made to suit any special requirement. Price quoted upon application.

Vertical Spindle Attachment.—For special index or dial drilling, either automatically or by hand, or for circular milling such as arc and T slots, etc., and for all work requiring vertical or circular feeding movements or adjustments, this attachment is very convenient. It is readily applied in place of the cutter spindle box. Variations in design may be made to suit special requirements. Price quoted upon application.

Internal Gear Cutting Attachment.—The design of the machine renders it especially convenient to adapt for this work. We are prepared to supply such attachments designed to suit any special work but prefer to correspond regarding the various details of the work required. Price quoted upon application.

Power Feeding Attachment for Hobbing Worm Gears.—Where large quantities of worm gears are used an automatic feeding device will soon pay for itself in time saved. But for the ordinary requirements the regular machine, in which the feed is accomplished by hand, will afford a very great saving over previous methods, since there is no necessity for nicking the blanks as a preliminary operation. We can furnish a simple power feed for this work, which will gradually advance the blank at any desired rate until the proper depth is reached, when its action will cease and a continuous alarm will be given. Price quoted upon application.

High Speed Attachment for Brass.—When the machine is to be used largely or exclusively upon brass work it will be desirable to modify the ratio of the cutter driving gears accordingly. We can supply such modified gears, either permanently or interchangeably mounted as desired. Price quoted upon application.

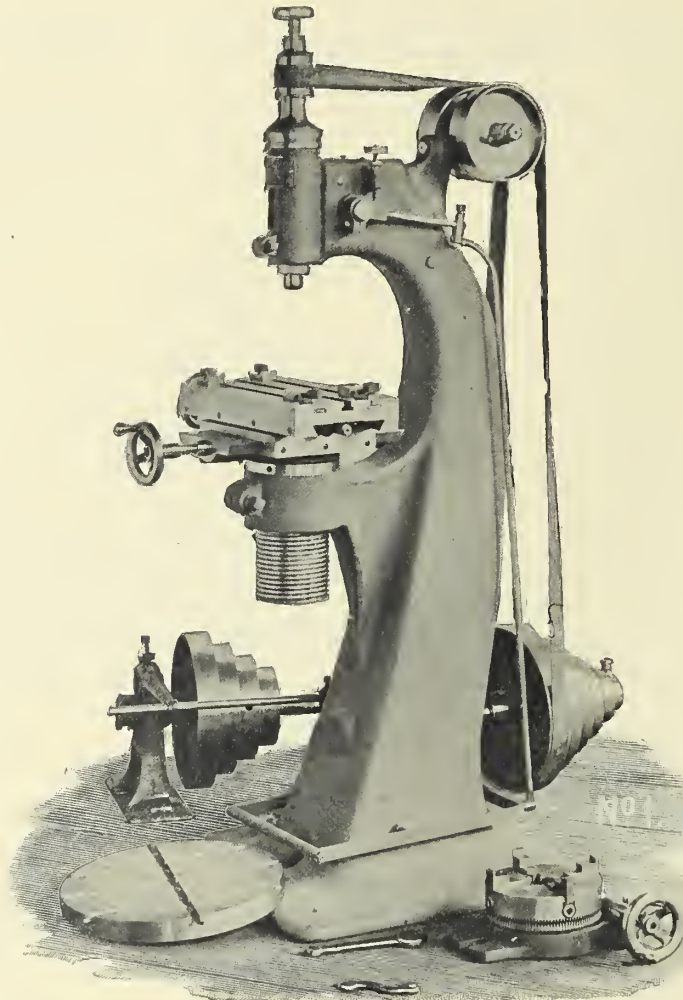
Rack Cutting Attachment.—When it is desired to cut both racks and gears upon the same machine the cutter driving mechanism must be modified in order to permit the unobstructed passage of the cut portion of the rack. When so modified the length of rack which may be cut is only limited by the construction of the sliding carriage in which the blank is mounted. We are prepared to supply machines equipped with such attachments, but prefer to correspond regarding the details of the work required.

Short Racks, not exceeding 10 inches in length, may be cut upon the regular No. 1 machine without modification of the cutter driving mechanism. Price quoted upon application.

Arbor Support or Back Rest.—Where a number of duplicate gears are to be cut in a string on a long arbor, a support or back rest is essential. We can supply such a support adapted to any special requirement. Price quoted upon application.

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FIG. 703.



VERTICAL MILLING MACHINE No. 1.

GENERAL DESCRIPTION.

SPINDLE is mounted upon a vertically sliding head, having a movement of 2 inches and means for locking same. Spindle pulley is 3 inches diameter, is 18 inches long, main bearing $\frac{7}{8}$ inch diameter, cutters are fastened by a draw-bar passing through the hollow spindle, gripping a collet, or the shank of an end mill. Is hardened and finished by grinding to insure accuracy.

Head is controlled by a foot lever, leaving the hands free to operate the slides. A stop-gauge is provided for the accurate gauging of the depth of the cut. The head is finely counterpoised, and very sensitive to the manipulation of the foot lever.

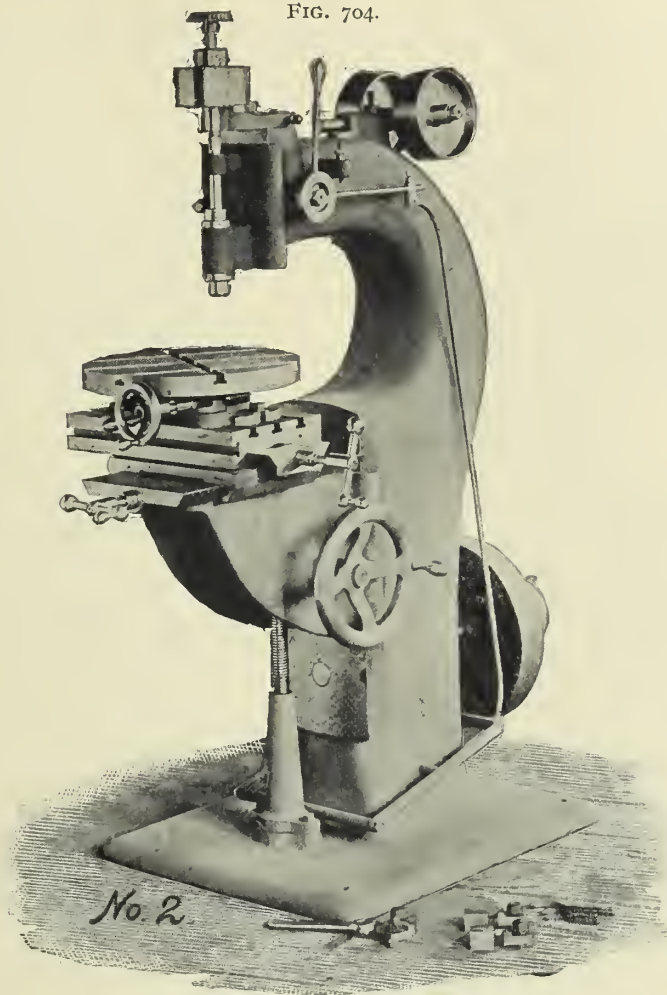
Table has a movement of 12 inches longitudinally, 10 inches in and out, vertical adjustment 6 inches. It has 3 tee slots running lengthwise of the platen, which is 15 inches long, 8 inches wide. Two sets of sliding grips fitted to the tee slots accompany the machine.

Rotary attachment may be fitted up with a 4 jaw chuck, or, if so preferred, a circular table 13 inches diameter with tee slots is furnished instead of the chuck, both may be obtained in special combination at a cost of \$12.00 additional, swings clear plates 18 inches diameter. Rotary table is graduated to 360°.

Countershaft has 4 speed cone, tight and loose pulleys 5 inches diameter and 3 inch face, speed about 800 revolutions.

Weight boxed, about	- - - - -	750 pounds
Price, complete, with rotary,	- - - - -	\$250 net cash
Price, without rotary,	- - - - -	200 net cash

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VERTICAL MILLING MACHINE No. 2.

GENERAL DESCRIPTION.

Spindle is mounted upon a vertically sliding head having a movement of 3 inches and means for locking same. It is made of tool steel, hardened and finished by grinding to secure accuracy. Cutters are fastened by a draw-bar passing the hollow spindle. Diameter, 1 inch. Length, 22 inches. Spindle pulley is 5 inches diameter.

Head is controlled by a foot lever while the hands are governing the slides. A stop gauge is also provided for accurate gauging of depth of the cut. The head is finely counterpoised, and very sensitive to the operation of foot lever.

Bearings of spindle are long, and run in bronze boxes provided with means of compensation for wear.

Table has a working surface of 17 x 9 inches with T slots running lengthwise. Longitudinal traverse, 15 inches. In and out motion, 12 inches.

Knee has vertical adjustment of 16 inches.

Rotary Attachment is an invaluable accessory, furnished with circular table T-slotted, or 9 inch 4-jaw chuck, according to preference. It is rotated by worm and worm-gear. Graduations, 360°. Diameter of table, 15 inches.

Countershaft has two pulleys, 8 and 12 inches diameter, for 3 inch belt. Small pulley should run from 500 to 800 revolutions, according to requirements. Large pulley, 150 revolutions.

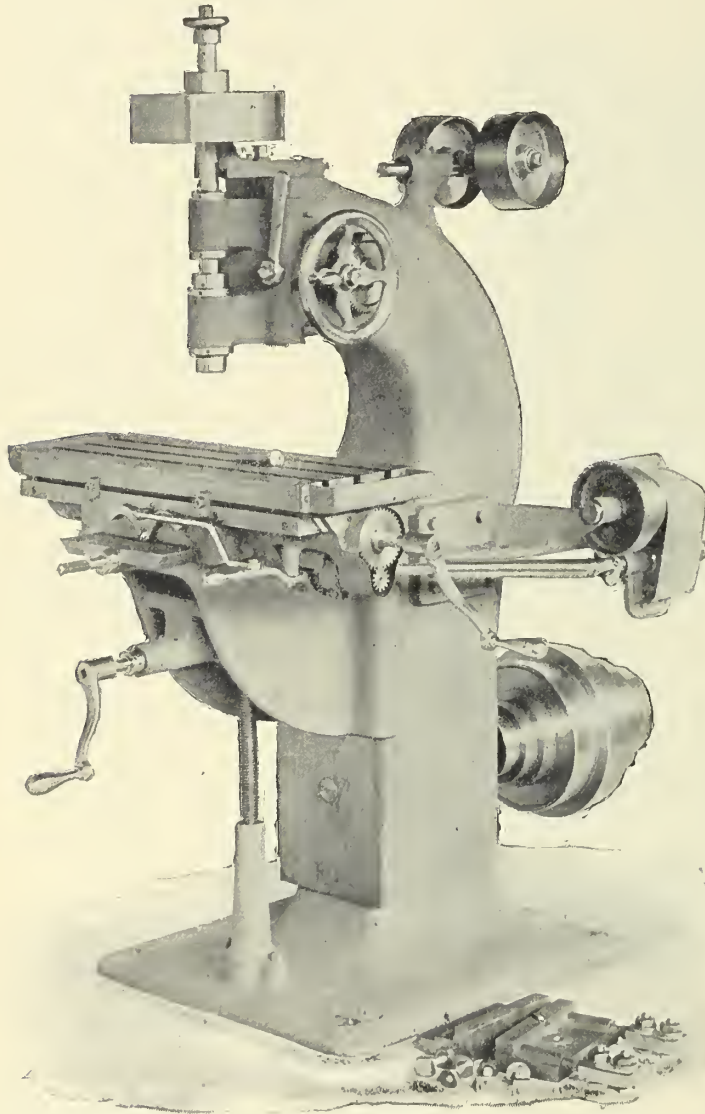
Gripping Jaws fit the T slots of table. They are very effective for holding plates, blocks, etc.

Weight, complete, about 1300 pounds.

Price, complete, with rotary attachments,	- - - - -	\$400.00 net cash
Price, without rotary attachments,	- - - - -	350.00 net cash

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FIG. 705.



VERTICAL MILLING MACHINE No. 3.

GENERAL DESCRIPTION.

Spindle is mounted upon a head having a vertical movement of 4 inches, with a locking device for quickly fastening the head at any point within the limits of its movement. Is hardened and finished by grinding to secure rotundity and accuracy. Tools are fastened by a draw-bar passing through the spindle, gripping the threaded end of a split collet, or shank of an end mill. Diameter of lower bearings, $1\frac{1}{2}$ feet.

Head is controlled by a geared hand wheel. A stop-gauge graduated to read to one-thousandths of an inch is provided for the accurate adjustment of the depth of the cut.

Driving Pulley of the spindle is 10 inches diameter, and $2\frac{3}{4}$ inch face, being independently mounted upon the auxiliary bearing which receives the entire one-sided action of the belt pull. The spindle being therefore relieved from the usual belt strain. It can be run at extreme high speed with small cutters without any danger of injury to spindle, besides preserving the allignment of the spindle with relation to the platen.

Bearings of spindle are long, and the boxes which are made of bronze, are provided with means of compensation for wear.

Table has a working surface of 28 x 10 inches, with automatic feed longitudinally, right and left hand, $21\frac{1}{2}$ inches. Vise, 8 x 2 inches.

Saddle is same length as the table. In and out feed, 12 inches, by hand. Both screws have graduated dials.

Rotary Attachment has a circular table 18 inches diameter, rotated by worm and worm gear. For die-sinking purposes a 4-jaw chuck may be substituted for the circular table.

Knee has vertical adjustment of 16 inches. Greatest distance between end of spindle and table, 17 inches.

Feeds are derived from compounded gears, giving 6 changes for each change of spindle speed.

Countershaft has 2 friction clutch pulleys. Speed for 8 inch, 500 revolutions, and for the 12 inch pulley, 125 revolutions. Width of belt, 3 to $3\frac{1}{2}$ inches.

Price, complete, - - - - - \$600.00 net cash

Price, without rotary, - - - - - 525.00 net cash

Weight, boxed, - - - 1800 pounds

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FIG. 706.

BECKER MILLING MACHINE No. 4.

GENERAL DESCRIPTION.

Spindle has long bearings running in bronze boxes provided with means of compensation for wear. It is $2\frac{1}{8}$ inches diameter at main bearing. Tools are fastened by a draw-bar passing through center of spindle.

Head has vertical movement of 5 inches, with provision made for locking same at any point within the limits of its motion. A stop-gauge graduated to read to one-thousandths of an inch is provided for accurate gauging of the depth of the cut.

Driving Pulley of the spindle is 12 inches diameter, $3\frac{3}{4}$ inch face. It is independently mounted upon an adjustable anti-friction bearing, (patented) by which means the spindle is kept in permanent allignment with relation to the table, is relieved from all belt strain and its bearings prevented from overheating and from wear.

Table has a working surface of 36 x 10 inches, with automatic screw feed longitudinally, right and left hand, 28 inches. Cross feed 13 inches, by hand. Both screws have graduated dials.

Knee has vertical adjustment of 17 inches. Greatest distance between end of spindle and table, 20 inches.

Rotary Attachment has a circular table 20 inches diameter with automatic feed in both directions. Will swing clear, 32 inches.

Feeds of the tables are derived from compounded gears through the universal joint connections, giving 6 changes for each change of spindle speed. The head is fed by a hand wheel powerfully geared, thus making this milling machine,

also a perfect boring and drilling machine. Segments up to 25 inches diameter can be milled with the rotary.

Vise made to work in combination with the T-slots of the table, is furnished with this machine. Size of jaws, steel-faced, 8 x 12 inches, will take in work 28 inches in length, or, the full working capacity of the table.

Countershaft has double friction clutch pulleys for 4 inch belts. Pulley 14 inches diameter, should run about 125 revolutions, and the 10 inch pulley about 425 revolutions.

Price, complete, with rotary,	- - - - -	\$	net
Price, without rotary,	- - - - -	\$	net
Price, without automatic feeds, but with hand rotary,	- - -	\$	net
Price, without automatic feeds, and without rotary,	- - -	\$	net

Weight, boxed, about - - - 2400 pounds

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FIG. 707.

VERTICAL MILLING MACHINE No. 5.

GENERAL DESCRIPTION.

THE No. 5, as illustrated, embodies the latest improvements, the spindle is powerfully back-gear, the frame is very heavy and rigid, capable of sustaining heavy cuts without vibration.

Spindle has long bearings running in bronze boxes provided with means of compensation for wear. Diameter of main bearing, 3 inches front end is threaded for use with large surface mills. Shanks of end mills are secured by the draw-bar which passes through the center of the spindle. To get rid of end play, the lower bearing is provided with ball thrust bearings at both ends, thus reducing friction and securing a level surface when using face mills.

Driving Pulley of the spindle is 15 inches diameter $3\frac{3}{4}$ inch face, double back-gear, 5 to 1. It is independently mounted, same as on No. 4 miller, to secure the permanent alignment of the spindle. This is a valuable feature on a vertical spindle milling machine, as without it the spindle is eventually worn out of alignment, impairing the general usefulness of the machine, by making the use of large surface mills impracticable, for obvious reasons.

Head has vertical traverse of 7 inches automatically, with automatic stop. Stop gauge graduated to read to thousandths of an inch is provided for the accurate adjustment of the depth of the cut. The automatic head on this machine thus makes it a superior boring and drilling machine.

Table has a working surface of 48 x 13 inches. Automatic screw feed in all directions. Longitudinal feed 40 inches, cross feed 13 inches,

Rotary Attachment has a circular table 22 inches diameter with automatic feed in both directions provided with automatic stops. Swings 34 inches clear.

Feeds of the tables are derived from compounded gears, giving 6 changes for each change of spindle speed.

Knee has vertical adjustment of 18 inches, greatest distance between end of spindle and main table, 21 inches; between spindle and rotary table, $15\frac{1}{2}$ inches.

Vise is made to work in combination with the T slots of the table. Size of jaws, steel faced, 9 x 2 inches; these are quickly adjusted, and their capacity is limited only to the working capacity of table.

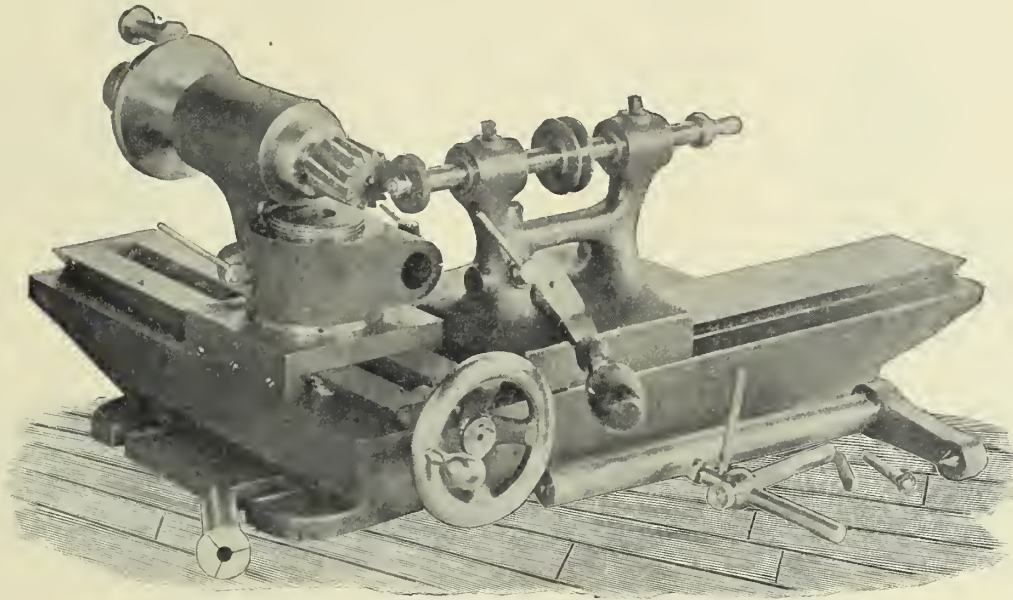
Countershaft has double friction clutch pulleys, sizes 12 inches and 18 feet diameter by $4\frac{1}{2}$ inches. Speeds, 120 and 400 revolutions, respectively.

Arbor-Support or overhanging arm is attached to the knee, is used only for straddle milling purposes, gang milling and kindred work.

Price, complete, with rotary,	- - - - -	\$	net
Price, without rotary,	- - - - -	\$	net
Weight, boxed, about,	- - - - -	4300	pounds
Floor space,	- - - - -	5	feet x 5 feet
Height,	- - - - -	6	feet 8 inches

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FIG. 708.



No. 3 GRINDER AND MILLING MACHINE ATTACHMENT.

PRICE, \$100, NET.

DIE SINKING MACHINE.

GENERAL DESCRIPTION.

SPINDLE is mounted upon a head having a vertical movement of 4 inches, with a locking device for quickly fastening the head at any point within the limits of its movement. Is $1\frac{1}{2}$ inches diameter at main bearing, is hardened and finished by grinding. Tools are fastened by a draw-bar passing through the spindle, gripping the end of a collet or the shank of an end mill.

Head is operated by a geared hand wheel, and a stop-gauge finely graduated to read to thousandths of an inch, is provided for the accurate adjustment of the depth of the cut.

Driving Pulley of the spindle is 10 inches diameter, $2\frac{3}{4}$ inches face, is mounted same as on the No. 3 machine, and is therefore adapted to run at high speed with small cutters. Spindle pulleys, 3, 5 and 8 inches diameter are also made to interchange with the 10 inch pulley.

Bearings of spindles are long, the boxes are made of bronze, and are conical in form, are split so that they can be readily depressed to take up wear.

Table has a working surface of 28 x 10 inches; longitudinal feed by hand, 21 inches; cross feed, 12 inches; vise, 8 x 2 inches; capacity is limited only by the length of the table. Jaws, steel faced.

Knee has vertical adjustment of 16 inches; greatest distance between end of spindle and table, 17 inches.

Rotary Attachment has circular table 18 inches diameter, rotated by worm gear. It is graduated to 360°. The table is removable so that a 4-jaw lathe chuck can be substituted, which is very desirable on many kinds of die work usually done in jewelry manufacturing establishments.

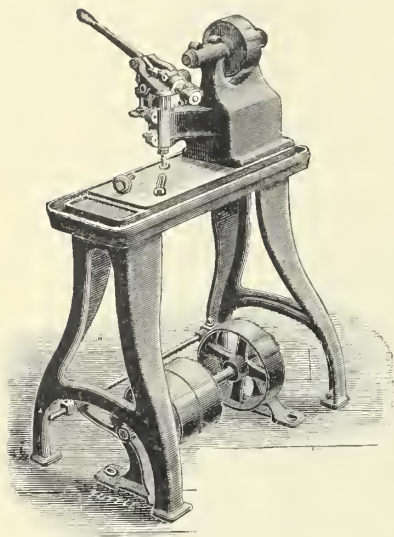
Countershaft has 2 friction clutch pulleys, 8 inches and 12 inches diameter, for the fast speed counter should run about 600 revolutions, and for the slow speed 125 revolutions per minute.

Price, complete, with rotary,	- - - \$475.00	Price, 5 inch spindle driver,	- - - - \$5.00
Price, without rotary,	- - - 400.00	Price, extra set of idlers,	- - - - 5.00
Price, 3 inch spindle driver,	- - - 5.00	Shipping weight, about,	- - - 1700 pounds

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FIG. 709.

SCREW SLOTTING MACHINE.



IN this machine we have sought to produce an easily and rapidly operated device, which could be sold at a reasonable price. In the construction of the machine we have aimed at simplicity and convenience of working. The entire operation is a straight downward motion for gripping and slotting the screw, and the upward return motion releases it and leaves the jaws ready for the next. One jaw being adjustable, screws from $\frac{3}{16}$ to $\frac{1}{2}$ inch in diameter can be handled without the trouble of changing any of the parts. The bearings of the machine are all adjustable, to compensate for wear, and convenient adjustments are provided for position and depth of slot. This machine aside from screw slotting, may be applied to work which demands various forms of light milling where extra speed of manipulation is desired. We have recently added an improvement by which the clamping device for holding screw can be swung to one side when down, for removing and inserting screw without

danger of hitting the saw. We have also added an improved spring for balancing clamping device, which can be adjusted to any desired tension.

GENERAL DIMENSIONS.

Tight and loose pulleys on countershaft,	-	-	-	-	-	8 x $2\frac{1}{2}$ inch face
Speed of countershaft,	-	-	-	-	-	155 revolutions
Weight of machine, complete,	-	-	-	-	-	330 pounds
Price of machine, complete,	-	-	-	-	-	\$80.00

COCK GRINDER.

FIG. 710.

THIS MACHINE is designed for grinding-in keys for steam, water and gas cocks up to 2 inches in diameter.

The spindle is rotated by a reciprocating segment, which gives one and one-quarter revolutions alternately in each direction.

The machine pulley is 10 inches in diameter for a 3 inch belt.

The countershaft has a 10 inch tight and loose pulleys for 3 inch belt, and should run at a speed of 160 revolutions per minute, which gives the proper spindle speed for average work.

Floor space of machine, 2 feet x 4 feet 4 inches. Weight, ready for shipment, 450 pounds.

NOTE.—In setting up this machine, care should be taken to see that the crank disc revolves in the direction indicated by the arrow stamped upon it.

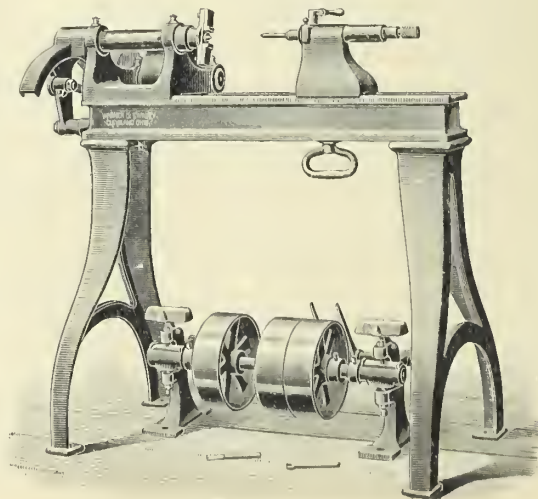
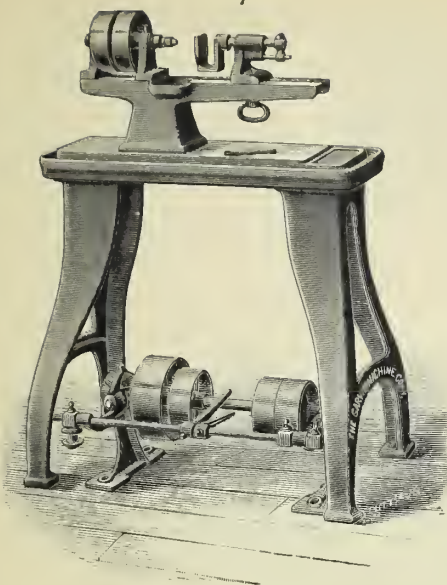


FIG. 711.

**No. 1 TAPPING MACHINE.**

This machine is mounted on a planed iron table with a groove around the edge to catch the oil and chips. There is also an oil pan cast as part of the bed, directly under the tap. An aluond chuck is furnished for holding taps. This machine will tap holes ranging from $\frac{1}{8}$ to $\frac{3}{16}$ inch diameter, and is fitted with adjustable collar same as described in No. 2 Tapping Machine. For high speed tapping we make this machine with friction clutch between the pulleys. Countershaft hangers are adjustable and self-oiling.

SPECIFICATIONS.

Greatest distance between chuck and face for work,	- - -	7 $\frac{3}{4}$ inches
Tight and loose pulleys,	- - - - -	6 x 2 $\frac{1}{2}$ inch face
Speed of countershaft,	- - - - -	225 revolutions
Weight, complete,	- - - - -	260 pounds
Price,	- - - - -	\$60.00

No. 2 TAPPING MACHINE.

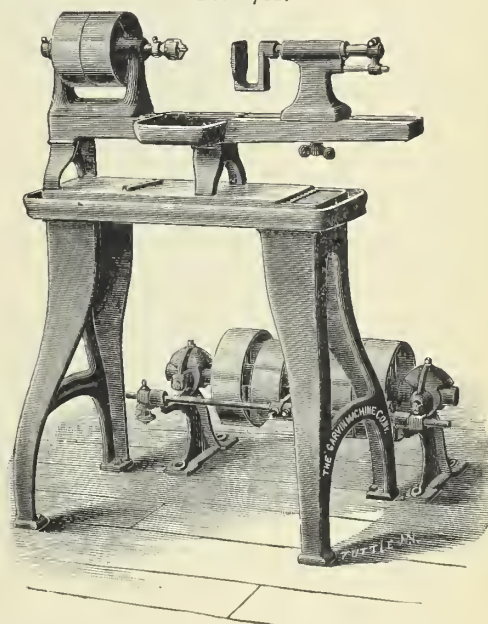
In general design this machine is like the No. 1 Tapper described, but is larger and of sufficient capacity for tapping holes from $\frac{3}{16}$ to $\frac{1}{2}$ inch diameter. The spindle is driven in the same manner. It is fitted with an adjustable collar on the front end to regulate the depth of the tapping, and a universal three-jaw chuck is furnished for holding the tap.

We can also furnish with this machine a special tail block, arranged with hollow spindle and spring chuck designed for threading rods or special work that can be best held by chuck. This fixture has a capacity for $\frac{3}{16}$ to $\frac{1}{2}$ inch stock.

SPECIFICATIONS.

Greatest distance between chuck and face for work,	- - -	10 $\frac{1}{2}$ inches
Tight and loose pulleys on countershaft,	- - - - -	10 x 3 inches
Speed of countershaft,	- - - - -	150 revolutions
Net weight, as shown in cut,	- - - - -	350 pounds

FIG. 712.

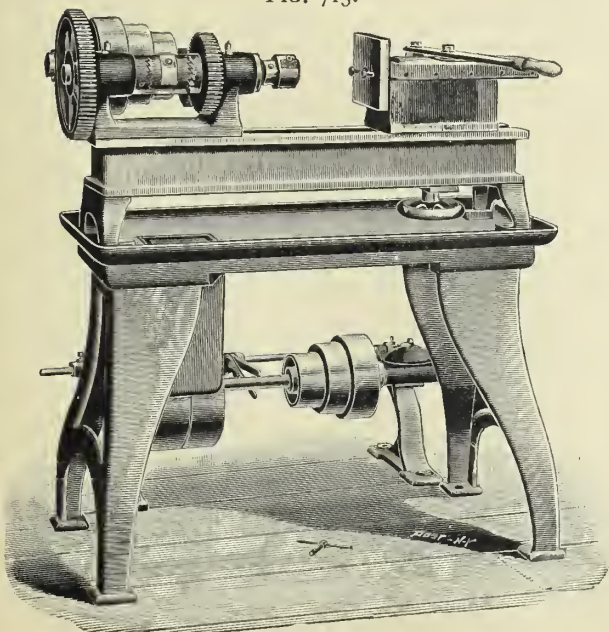
**No. 3 TAPPING MACHINE.**

This machine operates on the general plan of small horizontal tappers, but is geared up sufficient to tap $\frac{3}{4}$ inch diameter. The work is held on the face plate and pressed on to the tap by the lever shown. When the tail-stock slide strikes the stop, the driving clutch is gradually drawn out of gear and then a slight backward pull on the lever throws in the fast-running reversing clutch. The tap chuck is a self-centering, two-jawed chuck of special construction. The body of the chuck makes a universal joint with the end of the spindle to accommodate work out of center or taps not running true. The chuck jaws grip the round shank of the tap to center it, and also close in around the square end to drive by. The tail block is adjustable along the bed and bound by the hand wheel shown. Chips and oil fall through the open bed to the large pan below, and the oil drains into reservoir whence it is drawn off to supply an oil pot over head not shown in cut.

SPECIFICATIONS.

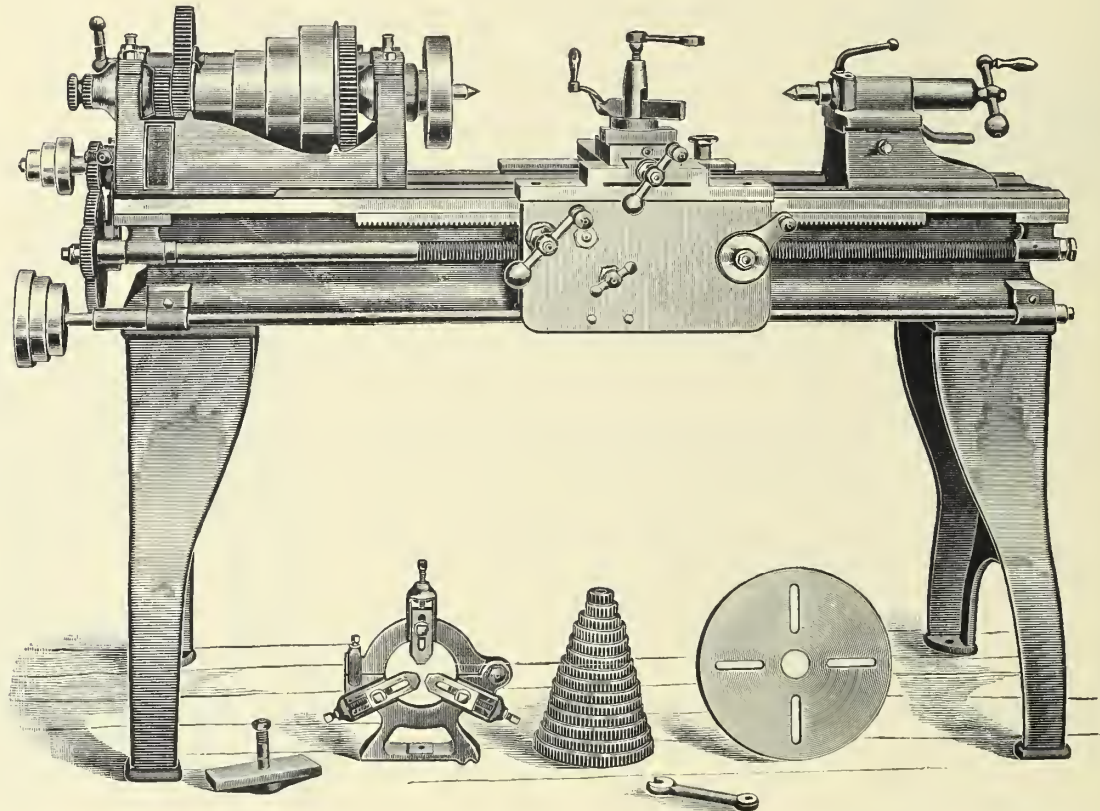
Tight and loose pulleys,	- - - - -	8 x 3 inches
Speed of countershaft,	- - - - -	350 revolutions
Weight,	- - - - -	540 pounds
Price,	- - - - -	\$200.00

FIG. 713.



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FIG. 714.



PRENTISS STANDARD ENGINE LATHE.

13 INCH SWING WITH RAISE AND FALL REST.

THE above cut represents our Improved Standard Engine Lathe, 13 inch swing, with raise and fall rest. This Lathe is made from entirely new patterns, much heavier than usually furnished on lathes of the same size. The design is intended to give strength as well as accuracy, and ease and quickness of operation. Lathes are furnished with either cast iron or phosphor bronze bearings, as desired.

All Lathes are furnished with hollow spindle made from high carbon steel.

The lead and all actuating screws, rack and pinions in apron are made of steel and cut from the solid. Lathes are furnished with raise and fall, plain gib or compound rests; also with taper attachments and power cross feed when required.

We carry a large stock of these lathes in 13, 14, 16, 18, 20, 24, 28, 30 and 36 inch swing and any length of bed.

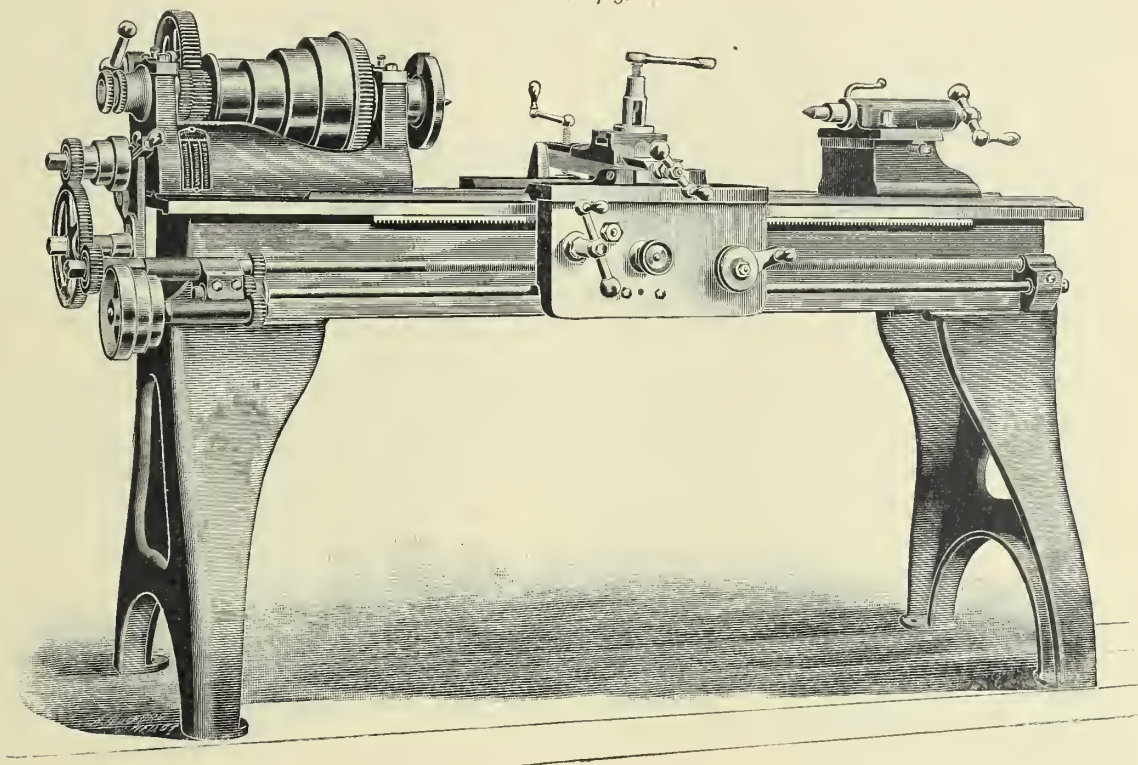
Lathes are furnished with either plain gib raise and fall or compound rest, and with or without compound rest, or taper attachment.

SPECIFICATIONS.

Swing of lathe,	-	-	-	13 inches	Diameter of largest step,	-	-	-	8 inches
Swing over plain gib rest,	-	-	-	8½ inches	Face of largest step,	-	-	-	2 inches
Swing over raise and fall rest,	-	-	-	7 inches	Diameters of pulleys on countershaft,	-	-	-	10 inches
Length of bed,	-	-	-	5 feet	Face of pulleys on countershaft,	-	-	-	3 inches
Turns between centers,	-	-	-	26 inches	Speed of countershaft,	-	-	-	150 revolutions
Hole through spindle,	-	-	-	¾ inches	Weight,	-	-	-	1100 pounds
Number of steps on cone,	-	-	-	4					

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FIG. 715.



14 INCH LATHE.—6 FOOT BED.

This Lathe has gun metal boxes and hollow spindle. Diameter of hole in spindle, $1\frac{1}{8}$ inches.

Head is strongly back-geared.

Has steel feed-rod and leading-screw, with open and shut nut, and can be used with either belt or gear feed in turning.

Cuts threads, 3, 4, 5, 6, 7, 8, 9, 10, 11, $11\frac{1}{2}$, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30.

Has 10-pitch steel rack, with steel pinion running in it.

Cone has 4 sections, $8\frac{3}{8}$, $6\frac{7}{8}$, $5\frac{1}{8}$ and $3\frac{3}{8}$ by 2 inch face.

Centers conform to Morse taper No. 3.

Swing over ways, 14 inches; swing over plain and comp. rest, 10 inches.

Swing over elevating rest, $7\frac{1}{4}$ inches.

Distance between centers, 3 feet 4 inches.

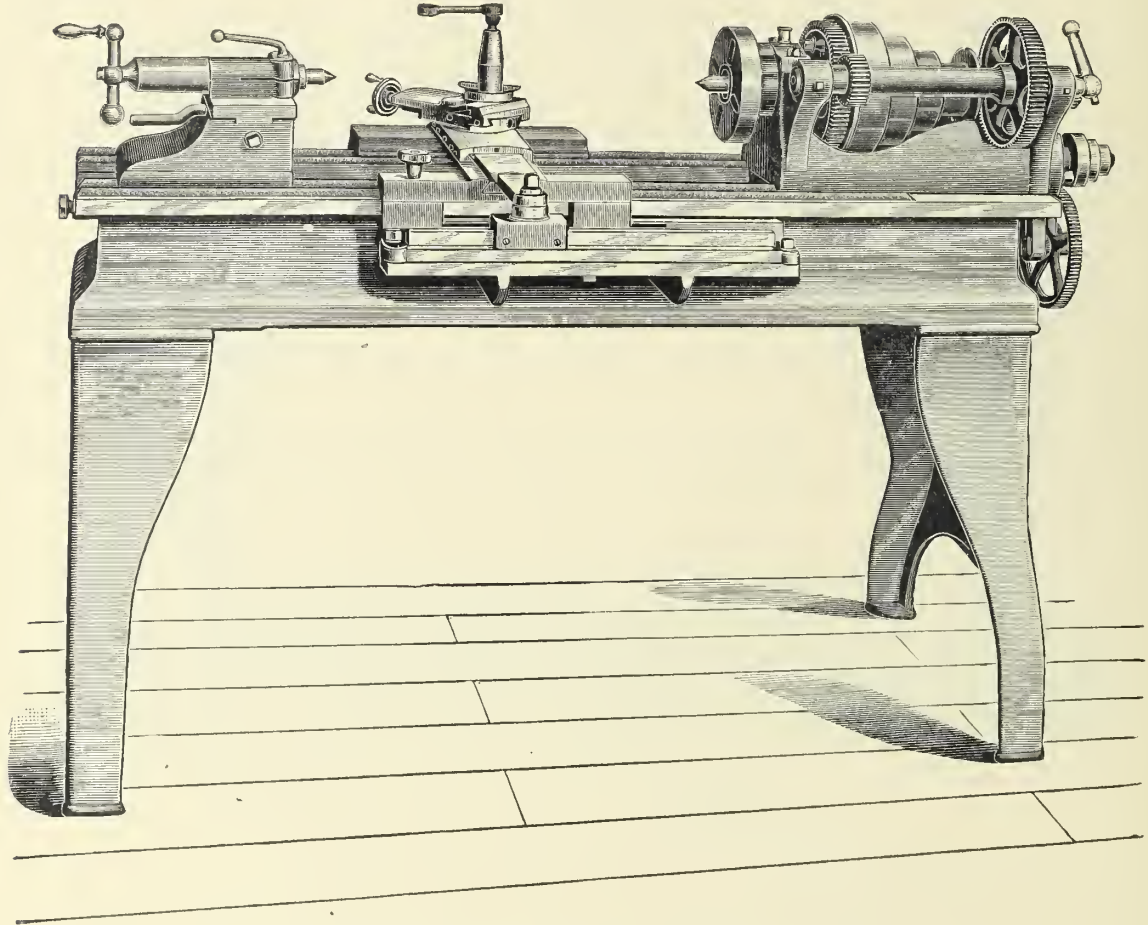
Has friction countershaft, with pulleys 10 inches in diameter and $2\frac{3}{4}$ inch face.

We make this Lathe with either raise and fall back gibbed rest, plain gibbed rest with power cross feed, or compound rest with power cross feed. The outfit of each Lathe is 1 large and 1 small face plate, 1 center rest, 2 centers of tool steel, a set of change gears to cut the above threads, countershaft and necessary wrenches.

Taper attachment furnished if desired.

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FIG. 716.



13 INCH SWING STANDARD ENGINE LATHE,
SHOWING TAPER ATTACHMENT.

THE LATHE has a dovetailed slide fitted into rest with packing, by which to take up the wear. The tool post shoe travels on this slide, which is extended back and connected with a guide block fitted to an adjustable, graduated guide bar. This bar is held in position by an adjustable bracket fitted to T slot on bed. To connect slide, remove taper pin in back side of rest and fasten slide to guide block with collar screw.

If the Lathe has power cross feed, be sure to drop intermediate gear in apron out of slide before connecting it. The rest screw is free to adjust the tool at all times.

The guide block has a travel of eighteen inches, and with adjustable bracket, the taper can be obtained on any part of the bed. This attachment will turn a taper of $3\frac{3}{8}$ inches to the foot.

This Lathe is made in the most thorough and workman like manner of the best materials. All bearings are scraped to a fit and all the Lathes are thoroughly tested before leaving the works.

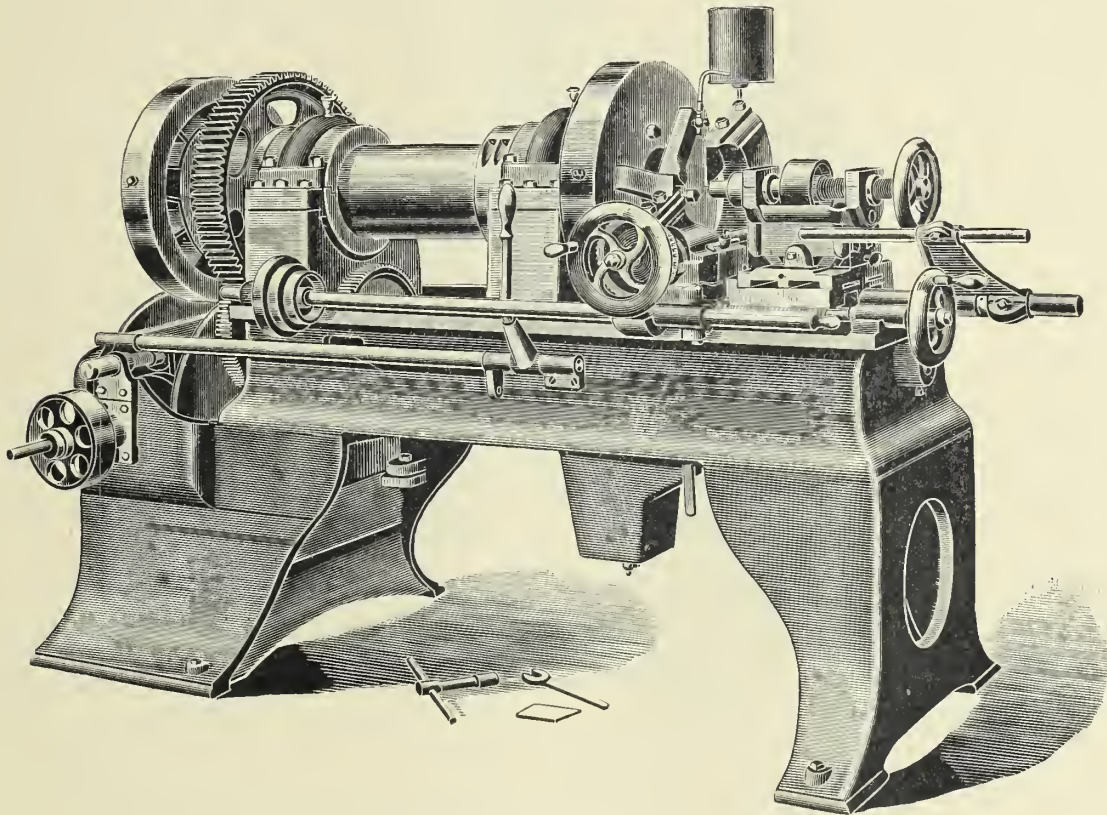
The head spindle is of crucible steel and runs in bearings of the best box metal, there being no Babbitt bearings in the Lathe. Length of spindle, $20\frac{3}{4}$ inches; diameter of front bearing, $2\frac{1}{8}$ inches; length of front bearing, $3\frac{3}{8}$ inches; diameter of back bearing, $1\frac{1}{8}$ inches. $\frac{3}{4}$ inch hole through spindle with No. 3 Morse taper for centers. The head is geared 8 to 1. Diameter of largest section of cone, $8\frac{5}{8}$ inches; diameter of smallest section of cone, $3\frac{3}{8}$ inches; width of belt 2 inches.

This combination makes a very powerful head for a 13 inch Lathe. The tail spindle is of crucible steel, $1\frac{1}{2}$ inches in diameter, and has a travel of 5 inches. Both tail and rest have long bearings on the bed, thus obviating any tendency to spring.

Swings over bed, 13 inches; turns 26 inches; 5 foot bed; swings over raise and fall rest, $6\frac{1}{2}$ inches; swings over plain gib or compound rest, 8 inches. Weight, 1150 pounds. Weight per extra foot, 70 pounds.

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FIG. 717.



SIX INCH CUTTING OFF MACHINES.

SHOWING CENTERING ATTACHMENT.

THESE MACHINES have a device by which the speed of the main spindle is increased or accelerated as the cutting tools approach the center. This acceleration is produced by a mechanism consisting of two discs, compressing between themselves two movable friction wheels of hard leather which drive the discs at a speed corresponding to the position of the wheels upon the discs. Each disc has a geared connection with the main spindle, and the friction wheels are driven by pulleys, one of which is shown in the cut, a corresponding one being at the back of the machine.

The two friction wheels are moved simultaneously by a right and left screw which is connected with the cross screw of the carriage so that as the tools are fed in, the wheels are also feed towards the center of the discs, thus running on a smaller diameter of the discs and driving them at a higher speed. The acceleration thus produced is gradual and regular and the fastest speed is about five times that at starting.

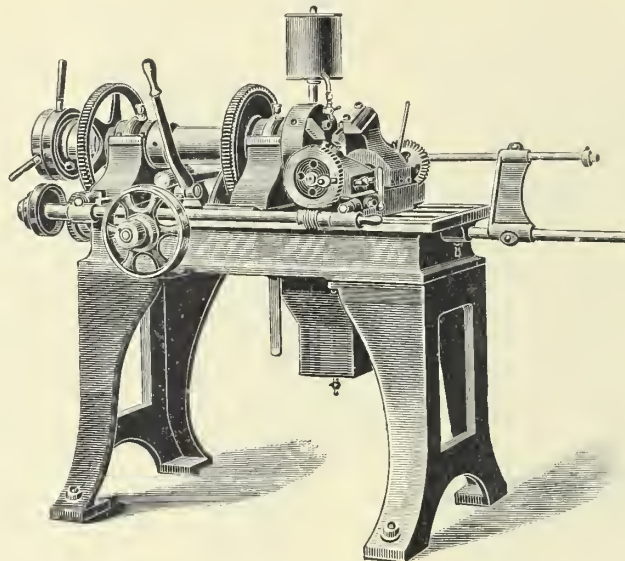
The machine is of a strong, solid build and has proved its superiority in the four years it has been on the market. In many cases it has taken the place of two or more cone driven machines and has repeatedly proven that it has nearly double the capacity of any cone driven machine including even our own two-tool machines.

One important feature of this machine is the tool blocks or carriers which are very solid and strong and carry wide blades set in recesses in the side of the blocks and clamped with a cap and bolts. Each recess forms a guide for setting the blades square and as each blade is supported out under the cutting point and sets at an angle to take a shearing cut, danger of breakage is reduced to a minimum. A special circular on tool-blocks will be sent on application.

All sizes are provided with three rates of automatic feed, an automatic stop, patent chip box, countershaft with two speeds, all necessary wrenches, gauges, etc. The countershafts of these machines set across the machine, but parallel countershafts can be supplied if necessary.

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FIG. 718.



CUTTING OFF MACHINES.

Two Inch Machine.—Takes stock from one-quarter to two inches diameter and cuts very fast, cutting two inch soft stock in about one minute.

Countershaft pulleys,	-	-	-	-	-	-	-	-	-	3 x 10 inches
Speeds per minute,	-	-	-	-	-	-	-	-	-	220 and 310 revolutions
Shipping weight,	-	-	-	-	-	-	-	-	-	1000 pounds

Three Inch Machine.—Has same general appearance as the above and takes stock up to 3 inches diameter. It has also traveling carriage.

Pulleys,	-	-	-	-	-	-	-	-	-	3 x 10 inches
Speeds per minute,	-	-	-	-	-	-	-	-	-	220 and 310 revolutions
Shipping weight,	-	-	-	-	-	-	-	-	-	1550 pounds

Four Inch Machine.—Takes rough stock from one-half to four inches in diameter and has traveling carriage.

Countershaft pulleys,	-	-	-	-	-	-	-	-	-	3½ x 12 inches
Speeds per minute,	-	-	-	-	-	-	-	-	-	220 and 325 revolutions
Shipping weight,	-	-	-	-	-	-	-	-	-	1900 pounds

Centering Attachment.—Any of these machines can be supplied with an attachment for drilling and centering the ends of stock. This is a convenient and accurate machine for this purpose, and will be found very useful when this work is required.

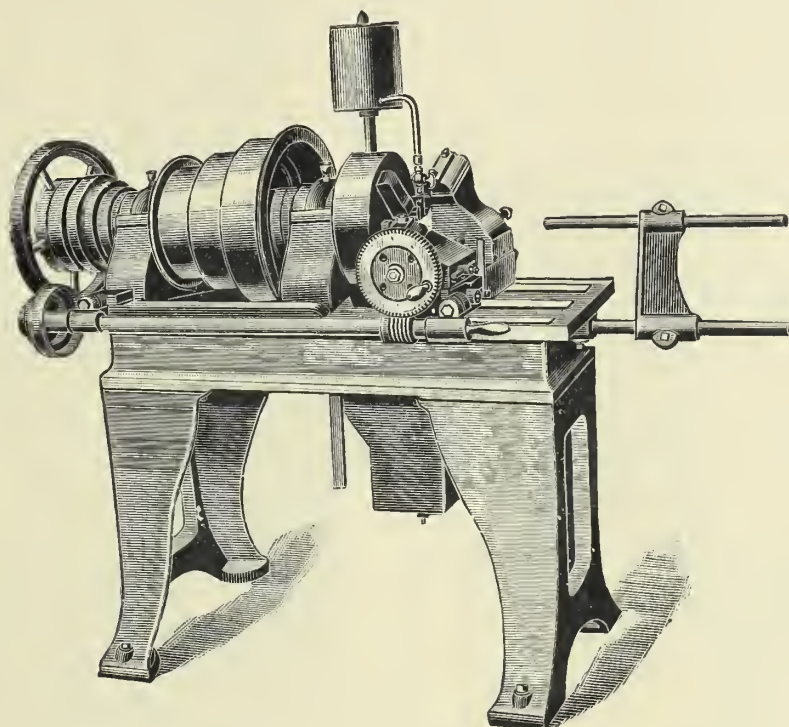
Six Inch Machine.—Appearance of five inch very similar, and following applies to both sizes: Chucks very heavy; large bearings; traveling carriage. Cut shown on page.

Pulleys,	-	-	-	-	-	-	-	-	-	3½ x 14 inches
Speeds per minute,	-	-	-	-	-	-	-	-	-	230 and 335 revolutions
Shipping weight, 5 inches,	-	-	-	-	-	-	-	-	-	2800 pounds
Shipping weight, six inches,	-	-	-	-	-	-	-	-	-	3200 pounds

Prices on application.

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FIG. 719.



CUTTING OFF MACHINES.

(CONE PATTERN.)

FOR occasional, ordinary shop use we recommend the Cutting Off Machine, which can be run by even inexperienced help, and which has excellent capacity, having two speeds on the countershaft, so that when the tools are half-way through, the shipper can be thrown over and the faster speed used for the remainder of the cut. This style of machine is simple and durable and requires the minimum amount of attention and its capacity exceeds that of many other machines.

Two-Inch Machine.—Has been re-designed this year and is shown in above cut. This machine cuts rough stock from $\frac{1}{4}$ to 2 inches diameter, has take-up rings on spindle, and is sold at a very low price for a machine of this size.

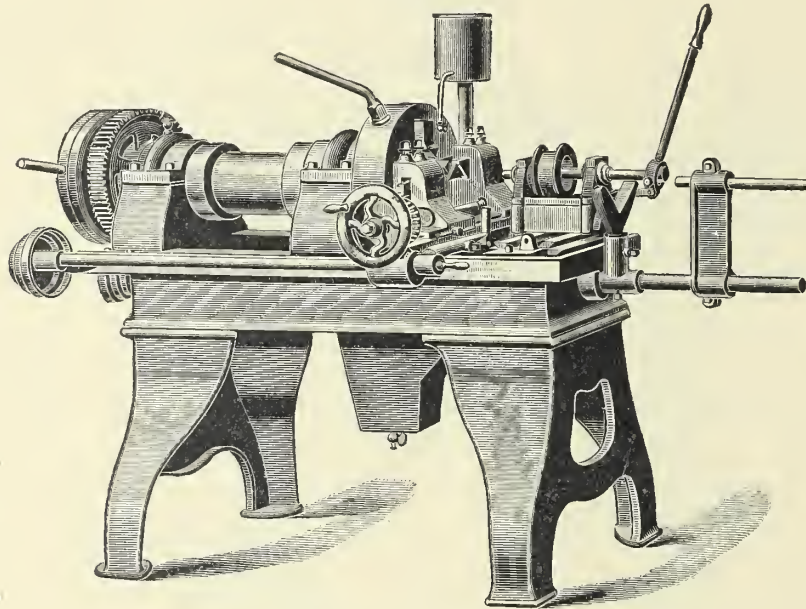
Countershaft pulleys,	- - - - -	3 x 10 inches
Speed per minute,	- - - - -	100 revolutions
Shipping weight,	- - - - -	800 pounds

Three-Inch Machine.—Cuts rough stock $\frac{3}{8}$ inch to 3 inches diameter.

Countershafts has two speeds with patent shipper and pulleys,	-	$3\frac{1}{2}$ x 14 inches
Speeds per minute,	- - - - -	60 to 100 revolutions
Shipping weight,	- - - - -	1400 pounds

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FIG. 720.



CUTTING OFF MACHINES.

(CONE PATTERN.)

Four Inch Machine.—This machine cuts rough shaft from $\frac{1}{2}$ to 4 inches diameter, and is now built with movable carriage. Cone pulley has four steps. Countershaft has two speeds and is furnished with two pairs fast and loose pulleys, 3 x 12 inches, and Hurlbut's patent belt shipper.

Speed per minute,	-	-	-	-	-	-	-	100 and 160 revolutions
Shipping weight,	-	-	-	-	-	-	-	1750 pounds

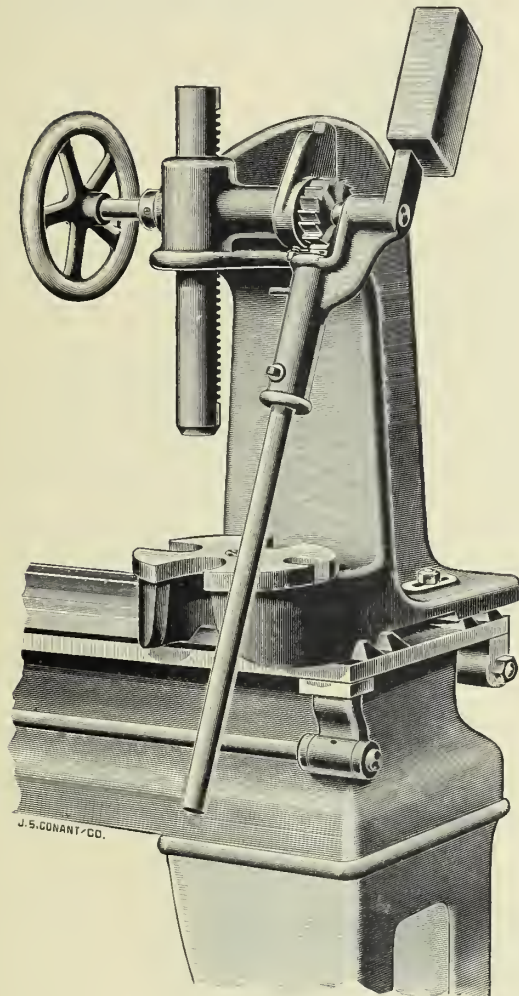
Five Inch Machine.—Cuts rough shaft from $\frac{3}{4}$ to 5 inches diameter, and has movable carriage. Countershaft has two speeds, and is furnished with two pairs of T and L pulleys, $3\frac{1}{2}$ x 14 inches, and Hurlbut's patent belt shipper.

Speed per minute,	-	-	-	-	-	-	-	100 and 180 revolutions
Shipping weight,	-	-	-	-	-	-	-	2200 pounds

Six Inch Machine.—Cuts rough shaft from 1 to 6 inches diameter, and has movable carriage. Spindle bearings, $8\frac{1}{2}$ inches diameter. Chucks are very heavy, 20 inches diameter. Countershaft has two speeds and is furnished with two pairs of T and L pulleys and Hurlbut's patent belt shipper. Shipping weight, 2900 pounds.

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FIG. 721.



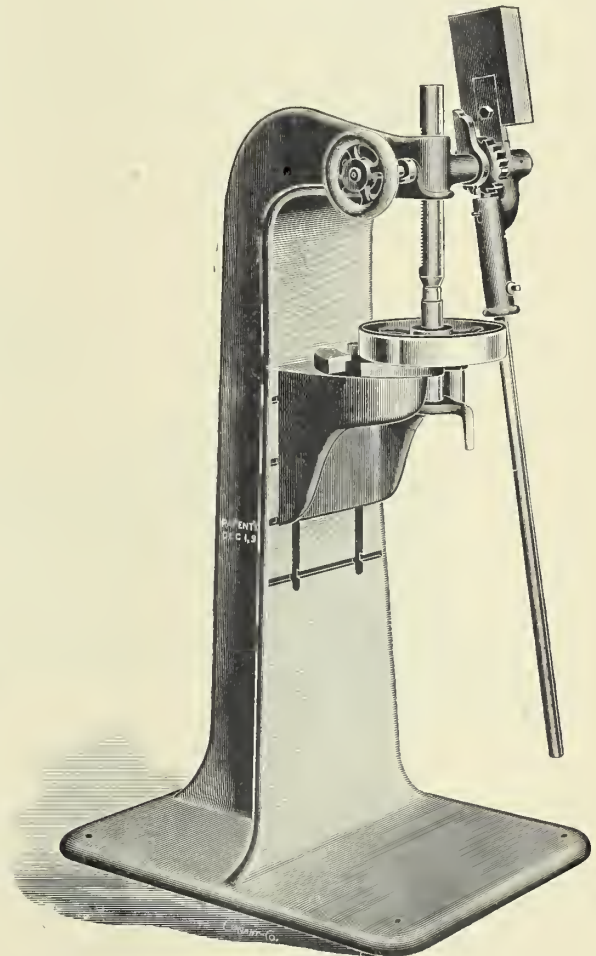
NO. 3 PRESS.

GREENERD ARBOR PRESS.

POINTS OF EXCELLENCE.

It saves marring, upsetting or springing the arbors.
 It saves cleaning out the centers and taking off the dogs. (See cut.)
 Saves defacing or otherwise damaging finished work.
 It preserves the arbors, and will pay for itself in the increased life of them. Clamping on to the end of the lathe bed, it is always at hand.
 A useful tool in the manufacture of machinery.
 Now built in three sizes.

FIG. 722.



NO. 4 PRESS.

No.	Largest Diameter of Work.	Diameter of Arbors.	Length of Arbors.	Weight.	Net Price.
2	8 inches	1 inch	7 inches	56 pounds	\$13.00
3	12 inches	1 1/2 inches	9 inches	90 pounds	16.00
4	19 inches	3 inches	24 inches	650 pounds	60.00

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BENCH STRAIGHTENING PRESS AND CENTER.

FIG. 723.

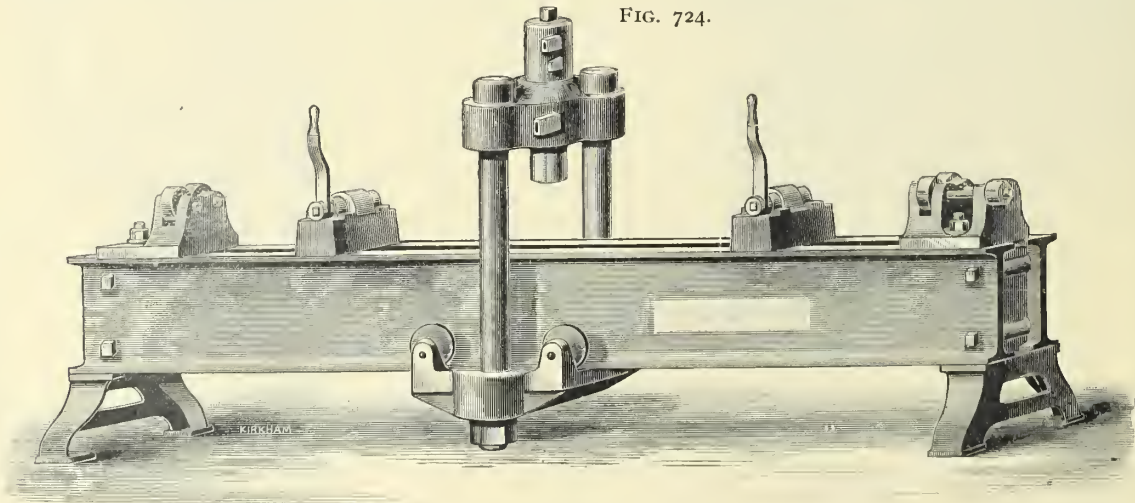
IT is intended to be placed upon the bench in the tool room or machine shop, and to be used when centering work by hand, and for straightening work centered by hand or machine. This machine, by bringing the centers upon which the work is tested, and the press by which it is straightened, together in the most convenient form, obviates the necessity of walking back and forth from the lathe to the anvil, block or press, and, in fact, has all the advantages for small work which the larger presses have for straightening shafting, etc. In the tool room, it is especially valuable, not only for centering and straightening work in the rough, but for straightening pieces which have been accidentally sprung in use; or, reamers, etc., which have been sprung in tempering.

The blocks upon which the work rests when being straightened are movable to or from the screw, and are kept in line by tongues which fit the groove shown. The screw is $1\frac{1}{4}$ inches in diameter, 4 pitch, of steel, and sufficiently powerful to bend a shaft $1\frac{1}{4}$ inches in diameter. The shaft upon which the centering heads are fitted is cold rolled, $1\frac{1}{4}$ inches in diameter, 40 inches in length. It is movable through the arm which supports it, being held in any desired position by the set-screw shown, which has a piece of brass over its points to avoid marring the shaft. The centering heads are clamped in any desired position on the shaft by the binding screw shown. The top of the arm which supports the shaft, forms a pocket for chalk or other material used in marking. The center at the right is pressed forward by a spring, and has a knurled head for drawing it back, both centers being provided with small oil wells, with brass fittings for convenience in oiling centers. The body of the machine has three lugs cast upon it, by means of which it is bolted to the bench. The block, which is on the end of the screw, is of cast-steel, case-hardened, and the centers of tool steel tempered—the whole machine being so designed and constructed as to make it worthy of a place and useful in any tool room or machine shop where much small work is turned.

Weight, - - - 130 pounds.

Price, - - - \$40.00

FIG. 724.



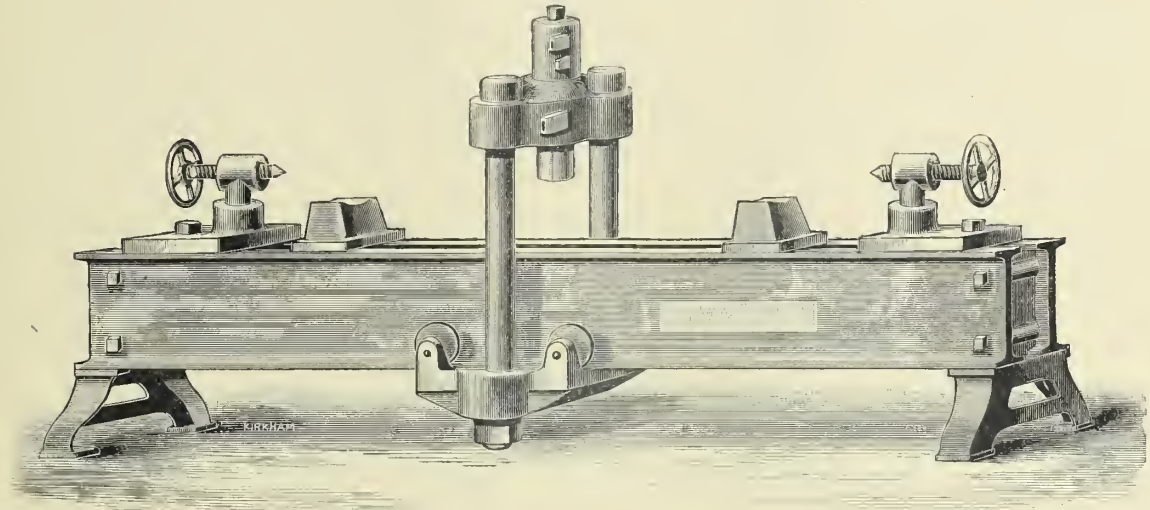
HAND POWER BAR STRAIGHTENING PRESS.

WITH ROLLERS.

THIS MACHINE has one of the special jacks attached to a steel frame, which is mounted upon rollers and which rolls upon the outside flanges of a pair of 15 inch "I" beams, which are made regularly 12 feet long. The jack is a special one, in which the ram can be moved up from or down to the bar without the labor of pumping, by means of a lever placed in the lower of the two sockets shown in the cut, or it can be made to return automatically. The extreme motion of which the jack is capable of is 4 inches. The shaft, when being revolved, is mounted upon two roller carriages upon which it can be easily turned. When straightening it is raised from the carriages by cams placed on bending blocks, which bear the strain of bending. The machine has a capacity of bending a $4\frac{1}{2}$ inch bar upon 2 feet centers. A small pulley placed upon one of the roller shafts will allow the bar to be revolved by power, if so desired. Price, 75 tons power, weight about 2050 pounds, \$425.00.

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FIG. 725.



HAND POWER CAR AXLE STRAIGHTENING PRESS.

THIS tool, as shown, is built from wrought iron beams with a jack of peculiar construction mounted upon a carriage which rolls freely from end to end upon the flanges of the beam. There are at each end centers mounted in the carriage which are adjustable on the bed, and which have the spindle holding the screw resting on springs. Two sliding bending blocks are inside of the centers. The jack itself is similar in construction to our improved hydraulic punch. The ram, which has a motion of four inches, can be moved up or down, to or from bending position without the labor of pumping, by means of the lever in the lower socket, shown in the cut. Greater variations from this can be accomplished in the blocking.

In operating the machine the carriage holding the bending device is thrown to one end of the machine, as it can be easily, with one hand, and then the machine is free to have the work placed upon the blocks without any drawing out or putting in endwise. The screw can then be brought up into the centers, and will raise the axle off the blocking.

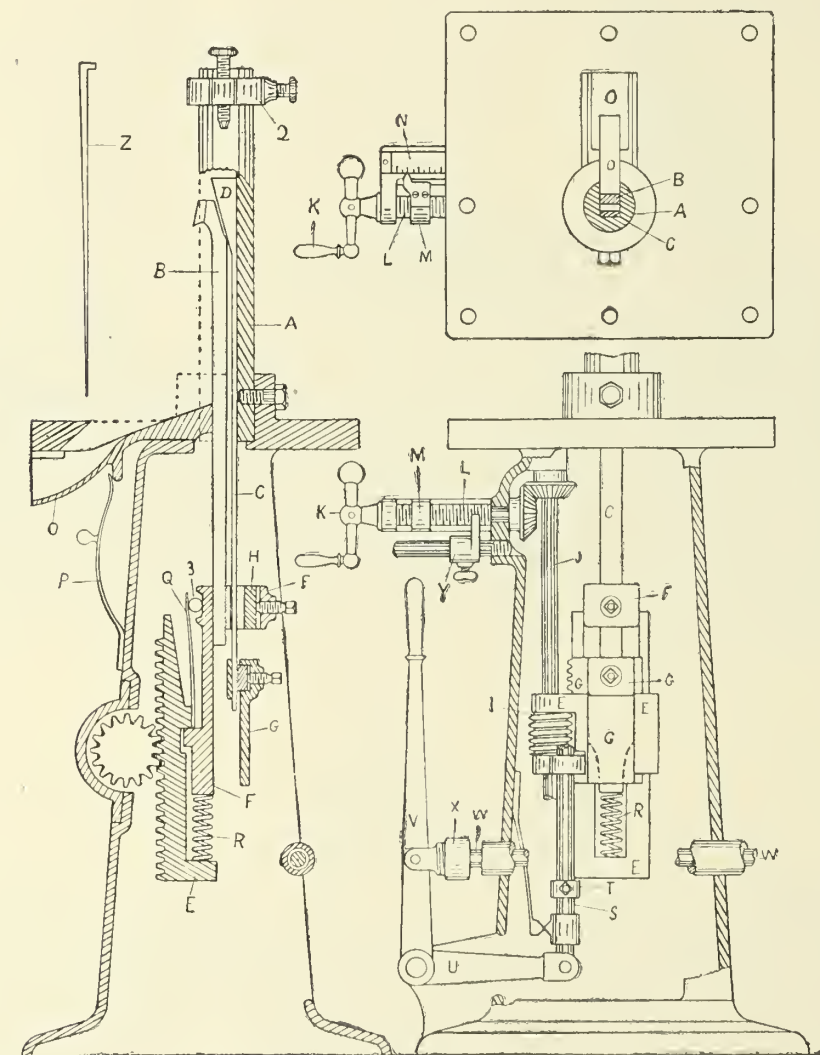
When the pressure is applied the centers and the spindles are first forced down upon the spring upon which they rest, until the axle rests upon the block, then, when the bending takes place, the centers raise upwards with the ends of the axle being perfectly free to move vertically.

The bending power of the press is about 75 tons, which is sufficient to bend a $4\frac{1}{2}$ inch iron bar on 30 inch centers.

Weight,	-	-	-	-	-	1200 pounds
Price,	-	-	-	-	-	\$375.00

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FIG. 726.



GIANT KEY SEATER.

THE above represents the working parts of the machine, with some of the details omitted or modified for the sake of greater clearness. The separate parts are explained on the opposite page. Take notice that the post and tool bar can be of any length, so that in the case of wide faced pulleys with two hubs, or very long chambered hubs, the upper end of the keyway can first be cut, and then the tool can be lowered to cut the other end. Thus the capacity for ordinary work can be practically doubled with but little extra first cost.

A—Post, grooved to receive the tool bar. It is made of various lengths and diameters.

B—Tool bar, with ratchet teeth at lower end to engage clamp, *H*. The tool bar can be of any length.

C—Wedge bar, made of any length to correspond to the tool bar.

D—Wedge, moves the tool forward and supports it continuously while cutting.

E—Cross head, driven by the pinion. Its stroke is regulated by setting the tappet collars on the rod, *S*.

F—Tool bar holder, attached to the cross head, on which it has a slight vertical motion.

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G—Wedge bar holder, it has a rack operated by the screw, *I*, by which it is moved on the cross head.

H—Clamp for tool bar, with an opening for wedge bar, *C*, to pass through.

I—Screw to operate *G*, it is reciprocated by the cross head and is rotated by the splined shaft, *J*, and by the mitre gears and handle, *K*.

J—Splined shaft which turns the screw, *I*, and on which it slides.

K—Handle which feeds the tool by moving the wedge, *D*.

L—Feed screw on which the indicator nut works.

M—Indicator nut, which shows on the scale the motion of the tool and the depth of the keyway.

N—Adjustable scale, one inch on which shows one-quarter inch feed of tool. The zero mark of the scale is set under the pointer when the tool begins to cut.

O—Spout to take away the chips and hold back the tool bar by pressure of spring, *P*.

P—Spring to hold back tool bar. It is swung sidewise to release the spout, *O*, when the tool bars are to be changed.

Q—Spring attached to cross head to push back the holder, *F*. The roller, *3*, being put between them to reduce the friction.

R—Release spring. When the tool drags on the up stroke this spring yields and the tool slips down on the wedge, *D*, and is thus relieved. The spring, *R*, lifts the tool to the proper place at the end of the up stroke.

S—Tappet rod, which operates the friction clutch, by means of the levers, *U* and *V*, and rod *W*.

T—Tappet collars, which when struck by the cross head move the rod, *S*. The one on the upper end is not shown.

V—Lever which can be also moved by hand to start and stop the machine.

W—Rod, which extends through the hollow shaft to shift the friction clutch.

X—Adjustable brass collar in which the head of the rod, *W*, revolves.

Y—Stop collar, adjustable to stop the nut, *M*, at any depth of keyway in making duplicate pieces.

Z—Taper wedge which is fastened in the post, *A*, behind the wedge bar, *C*, when taper keyways are to be cut.

z—Is a clamp adjustable vertically, to hold down the piece being key-seated.

The machine is so plain and simple in its construction that no extended description is needed beyond that afforded by the engravings, and especially by the outline drawing and description of the separate working parts.

Unlike other machines, the column and table are cast in one piece, and the table is quite small, being seldom used. To hold large pulleys no extension bars are needed, as any piece requiring a key-seat is supported solely by its hub.

The chief distinctive feature is the grooved post which holds the work and forms the guide for the tool. The use of this post solves the whole question of being able to obtain perfectly true, straight, square key-ways, without regard to whether the hole is straight or taper, or whether the hub is faced true, or left rough as it comes from the foundry. Every job is quick!y and accurately set and fastened by its bore only.

The great saving in money, represented by this feature alone, will soon pay for the machine.

On high grade machinery the hubs are usually faced true, but in many shops there is a large number of castings, such as sprocket wheels, gear wheels, and other pieces which do not need to have the hubs faced, except for the sake of having a true surface to work from in cutting the keyways.

It usually requires from three to ten times as long to face off the hub as is required to cut the key-seat.

If it is profitable to use a key-seater at all, is it not ten times more profitable, whenever it also saves turning off the end of a large hub?

By means of our new adjustable bushings, which fit the post, and which are adjustable to any diameter of hole, pieces of all kinds are quickly and accurately fastened. In the average run of work the piece can be fastened on the machine, key-seated and removed without stopping the tool, and it is done sooner than the same job could be only fastened on most machines.

A key-seat, 6 inches long, $\frac{1}{2}$ inch wide and $\frac{1}{4}$ inch deep, can be cut in two minutes, which includes time of putting on and taking from machine. Another, 11 inches long, $\frac{5}{8}$ inch wide and $\frac{5}{16}$ inch deep in three minutes, without any special effort for haste.

The New Giant will finish two ordinary key-seats before one piece can be fastened ready for key-seating on other styles of machines.

The cutters are simple and cheap, can be readily made in any shop, and can be changed to use the different sizes with the greatest facility. They can be sharpened without changing the width.

Straight or Taper Key-Seats.—A wedge tapered $\frac{1}{8}$ of an inch to the foot is put in the post back of the tool, this fixes the taper of the key-seats and maintains uniformity. By taking out the wedge, straight key-seats can be cut. Wedges of different taper can be used.

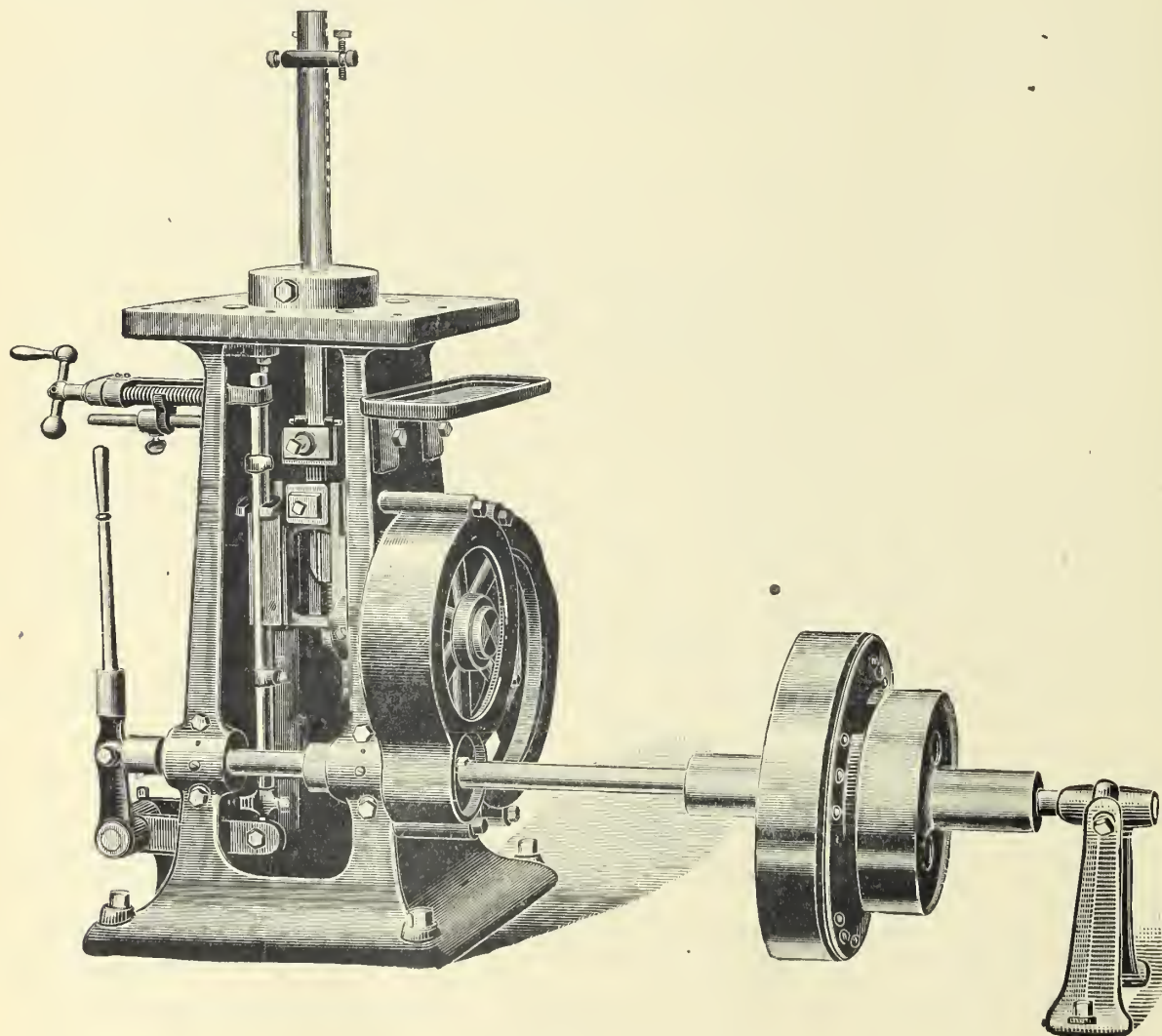
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The tool cannot spring. It has a perfect, solid support behind it the whole length of the stroke, making the key-seat perfectly straight, without the slightest springing at either end. No other machine equals it in this respect.

The tool is automatically relieved on the up stroke. It is not necessary to jerk a hand lever back and forth at every stroke as in other machines. The tool is moved as in a planer or shaper by means of the small crank shown in the cut.

Duplicate Work.—The nut on the feed screw carries a pointer, which indicates on a scale, the depth of the cut—one inch on the scale indicating $\frac{1}{4}$ inch feed of the tool. A stop which is set by a thumbscrew provides for cutting key-seats of uniform depth in duplicate work.

FIG. 727.



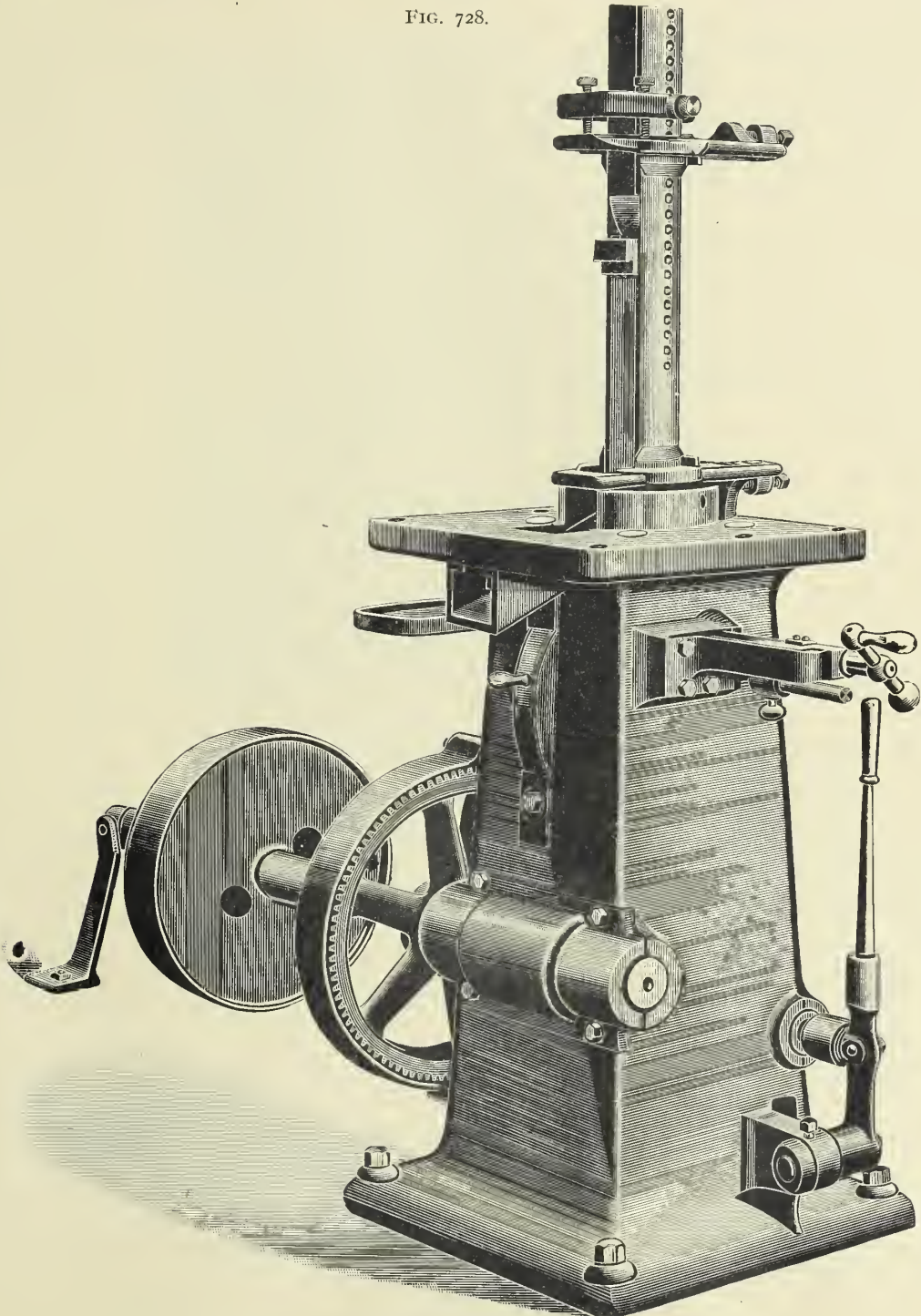
No. 3 GIANT KEY SEATER.

A key-vise can be furnished as an extra attachment; being fastened to the top of the post, one supports the other, forming a very simple and convenient arrangement for quickly planing keys of the exact taper of the key-seats.

The friction clutch is quick and strong, and by shifting the collars on the tappet rod, the stroke can be set for any length, from one inch to the extreme limit. The shaft can be made of any length as ordered, to bring the belts far enough from the machine to admit work of the largest diameter.

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FIG. 728.



No. 4 KEY SEATER, WITH 3 11-16 INCH POST.
SHOWING ALSO THE PAIR OF ADJUSTABLE BUSHINGS AND THE HOLDING DOWN CLAMP.

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Chips cannot fall on the working parts, and the gears are protected by a shield. The tool is easily stopped by means of the hand lever, and by it the motion can be reversed at any point of the stroke.

Extra long chambered hubs, pulleys of wide face with double hubs, long drums for elevators, or cylinders of printing presses and paper machines, can be key-seated on this machine when specially fitted. There is no limit to the length of such work which may be done, if only each separate key-seat is not longer than the stroke of the machine. For instance, the 15 inch stroke machine can be fitted to cut 15 inch key-seats in both ends of a hub which may be four or five feet long, or in the separate hubs of a pulley of any width of face. No other machine can equal it on this work.

The small machines can be fitted to cut key-seats in holes as small as one-half inch, and in key-seating small work, such as steel milling cutters one-half inch thick, eighteen or more pieces at one time can be cut. No other machine does this.

PRICES OF GIANT KEY-SEATERS AND EXTRA PARTS.

To meet the varied requirements of different shops, we give the prices of the machines separate from the different tool posts and cutters with which each may be fitted.

One may need an 18 inch stroke machine with cutters no wider than $1\frac{1}{4}$ inches, while another would want all widths up to $2\frac{1}{2}$ inches. In this way each may buy only what he needs.

As some prefer to furnish countershaft, we name a separate price on that also.

No. 1, 10 inch stroke,	- - - - - \$	No. 4, 19 inch stroke,	- - - - - \$
No. 2, 12 inch stroke,	- - - - - \$	No. 5, 25 inch stroke,	- - - - - \$
No. 3, 16 inch stroke,	- - - - - \$	No. 6, 31 inch stroke,	- - - - - \$
Countershaft for Nos. 1, 2, 3 and 4 machines,		- - - - -	\$15.00
Countershaft for Nos. 5 and 6 machines,		- - - - -	25.00

To the price of the machine must be added the prices of such parts as the purchaser may select from the following list :

Size of Machine to which the parts belong.	Diameter of Post.	Length of Key-way which may be cut.	Sizes of Cutters used in each Post.	Price of Post and full set of Cutters with Top Clamp and Adjustable Bushings.	Price of separate Cutters.	Price for Extra Length of Posts per inch additional.
No. 1	1 inch	9 inches	$\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$	\$25.00	\$2.00	\$1.00
No. 2	$1\frac{1}{8}$ inch	11 inches	$\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1	40.00	2.00	1.00
No. 3	$2\frac{3}{8}$ inches	15 inches	$\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$	45.00	2.25	1.25
No. 3	$2\frac{7}{8}$ inches	15 inches	$\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$	50.00	2.50	1.25
No. 4	$3\frac{3}{8}$ inches	18 inches	$\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2	55.00	2.75	1.50
No. 4	$3\frac{1}{2}$ inches	18 inches	1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{2}$	60.00	3.00	2.00
No. 5	$4\frac{7}{8}$ inches	24 inches	$1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{2}$, 3	100.00	3.50	2.50
No. 6	$5\frac{3}{8}$ inches	30 inches	$1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$	125.00	3.75	4.00

Any machine may have all the above parts belonging to smaller machines, but no machine can have any parts belonging to a larger size.

Any post with its tool bar can be made as long as required, for operating in both ends of long hubs having chambered cores, or in the two hubs of wide face pulleys, long drums and cylinders, or in cases where the hub to be key-seated is raised considerably above the table. In other words, any machine can be fitted to cut one or more key-seats, one at any height above the other, if each key-seat is not longer than the stroke of the machine.

From the table it will be seen that if one wishes to cut key-seats 18 inches long, and of all widths from $\frac{1}{4}$ inch up to $2\frac{1}{2}$ inches, he would require the No. 4 machine, with the 1 inch, $1\frac{1}{8}$ inch and $3\frac{1}{2}$ inch posts, which would cost \$125.00 in addition to the price of the machine and countershaft; or, if he should wish to cut the same length, and from $\frac{1}{4}$ inch to $1\frac{1}{4}$ inches wide, he would need the 1 inch post and the $2\frac{3}{8}$ inch post lengthened 3 inches, the price of which would be \$73.75, to be added as before. Separate cutters may be omitted, or intermediate sizes may be added at the list prices.

The pulleys on No. 1 and No. 2 are 18 inches and 12 inches diameter for 3 inch belts, speed 100 and 200 revolutions per minute. On the Nos. 3 and 4, the pulleys are the same sizes but the speeds are 150 and 300 revolutions per minute. On the No. 5 and No. 6, the pulleys are 24×5 inches, and 18×3 inches, and the speeds 150 and 300 revolutions per minute.

Parties ordering, should always state the diameter of the largest wheels they wish to key-seat that the driving pulley and belt may be set far enough from the machine.

Portable machines for any length or width of key seat made to order.

If parties writing for information will state as fully as possible the kinds of work they wish to do, and mention any special requirements, we can often make suggestions of value to them.

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FIG. 729.



No. 3 KEY-SEAT MILLING MACHINE.

THIS engraving shows a machine for milling key-ways in shafts, arbors, spindles, etc., the construction of which is apparent. The frame of the machine, which is very solid, and the support for the spindle slide are cast together, giving great rigidity, and when cutter is sunk the spindle slide is locked by the hold-fast nut, making the spindle and cutter practically a part of the main casting, allowing the heaviest cuts to be taken free from chatter and jar.

A steady screw is provided close to the cutter, adding materially to the stiffness of the cut, and a pair of expansion links allow the spindle slide to move up and down without altering the tension in the driving belt. An automatic trip, which can be set for any length key-seat, releases the feed, and the machine once started requires no further attendance.

The machine is strongly geared, and has a quick hand return for the carriage. Will cut key-ways in shafts from $\frac{3}{4}$ inch to 4 inches in diameter, and has a traverse of 20 inches without shifting the carriage. By simply slacking the clamping screw and returning carriage key-ways of any length may be cut.

The self-centering form of the bed and carriage render all marking and laying off unnecessary, and absolute uniformity of result is certain even when operated by ordinary labor.

We can furnish at a slight additional cost a sliding table with index centers taking 20 inches long and swinging 5 inches, with which cutters, reamers, nuts, etc., may be very nicely milled. We also furnish with this table a substantial vise, with jaws 4 inches wide, $1\frac{1}{4}$ inches deep, and opening 3 inches, with which keys and a variety of similar work may be milled. A set of mills with centering collet for each is furnished with the machine if desired.

Countershaft has 12-inch tight and loose pulleys, which should run about 275 revolutions per minute.

Shipping weight, about - - - - - 800 pounds

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PRICE OF No. 2 KEY-SEATER, AS SHOWN, \$75.00.

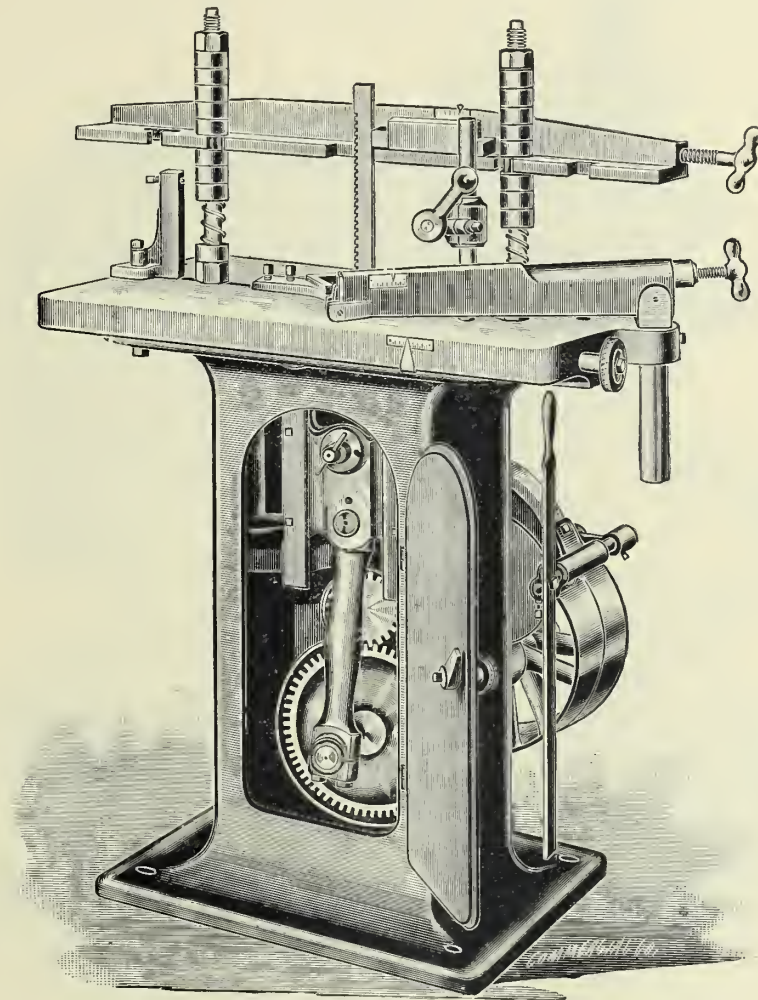
THE above cut shows our new machine for light work. This machine will cut from $\frac{1}{8}$ inch to $\frac{3}{8}$ inch key-seats in all ordinary work, and do it quickly and accurately. The feed is automatic which prevents all breaking of cutters. This machine will cut from 20 to 60 key-seats per hour on ordinary work, and is intended for all kinds of internal key-seating within its range. The depth and taper of the key-seats are measured accurately by scales and pointers, and any number of key seats can be cut of any depth and taper required, and all will be uniform.

PRICE OF CUTTERS FOR EITHER MACHINE.

[illegible]

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FIG. 731.

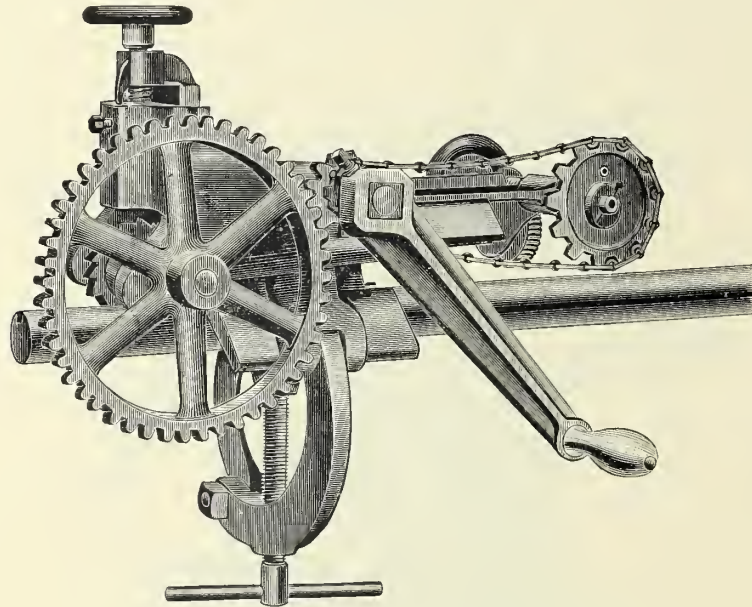


PRICE OF No. 1 MACHINE, AS SHOWN, \$125.00.

THE above cut shows our new and improved No. 1 key-seating machine, which will cut seats from $\frac{1}{4}$ to 1 inch. The machine is complete with heavy clamping bar for large work, also special clamping lever for small work. This machine will do all work accurately and quickly, the feed is automatic which prevents the breaking of cutters, and is intended for all machine shops having internal key-seating to do. The work can be placed in this machine and finished in the time other machines are being made ready. The depth and taper of key-seats are measured accurately by scales and pointers, and any number of key-seats can be cut of any given depth and taper. The table and special attachment can be used on all machine made by us since 1882.

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FIG. 732.



PORTABLE KEY-SEATER.

THE above cut shows the machine mounted on a small size shaft. It represents the machine as it appears after having cut a keyway four inches from the end of shaft. This machine will mill key-seats any length in shafting from $1\frac{1}{4}$ inches to $4\frac{3}{4}$ inches in diameter, and the following widths: $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{11}{16}$, $\frac{3}{4}$, $\frac{13}{16}$, $\frac{7}{8}$, $\frac{15}{16}$, 1, $1\frac{1}{16}$ and $1\frac{1}{8}$ inches, and any depth not exceeding $\frac{5}{8}$ inch. Each machine is furnished with six milling cutters, which by placing one or more on the spindle of the machine, key-seats the sizes mentioned above can be cut at one operation the width required.

When the cutters are kept sharp the machine will mill all key-seats up to $\frac{3}{4}$ inch wide, by $\frac{3}{8}$ inch deep at one operation, but for the wider key-seats it will be necessary to go over the work two or more times, according to the depth required.

The machine is provided with either automatic or hand feed while cutting, and has a dial to show the depth cut in the shaft. The machine will mill four inches before it is necessary to move the base forward on the shaft. An operator can easily cut a key-seat 12 inches long, $\frac{5}{8}$ inch wide, $\frac{5}{16}$ inch deep, in one hour, and other sizes in proportion.

With this machine it is not necessary to remove shafting from its hangers or boxes to cut a key-seat, and in this way a split pulley or coupling can be applied very quickly, or if a solid pulley is used, it is only necessary to remove hanger or box, so as to slide the pulley on the shaft, thus saving time, which amounts to a great deal where any number of persons are employed.

Price of machine with cutters, - - - \$40.00 net Weight of machine, - - - - 45 pounds

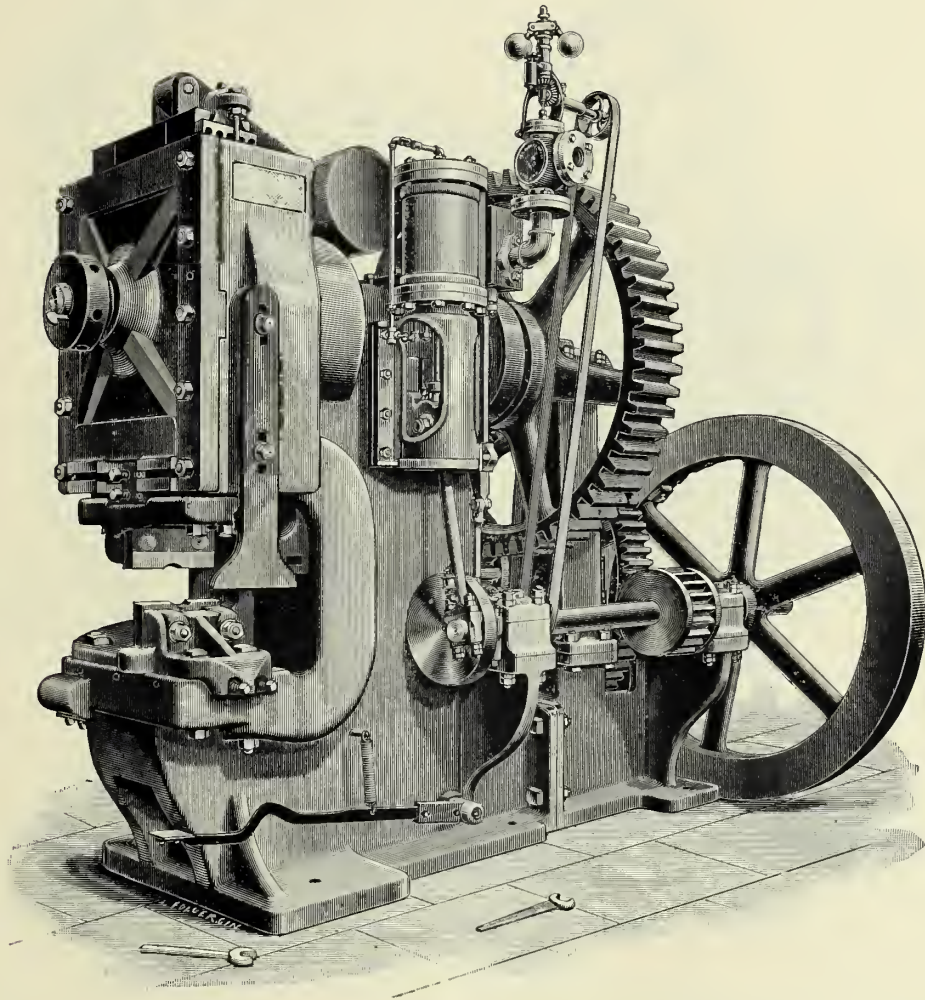
PRICE LIST OF CUTTERS FOR THE PORTABLE KEY-SEATER.

WIDTHS.		PRICE (NET).
$\frac{1}{4}$ inch,	- - - - -	\$1.40
$\frac{5}{16}$ inch,	- - - - -	1.50
$\frac{3}{8}$ inch,	- - - - -	1.60
$\frac{7}{16}$ inch,	- - - - -	1.70
$\frac{1}{2}$ inch,	- - - - -	1.80

Keep your cutters sharp. We keep machines and cutters in stock and can ship on receipt of order.

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FIG. 733.

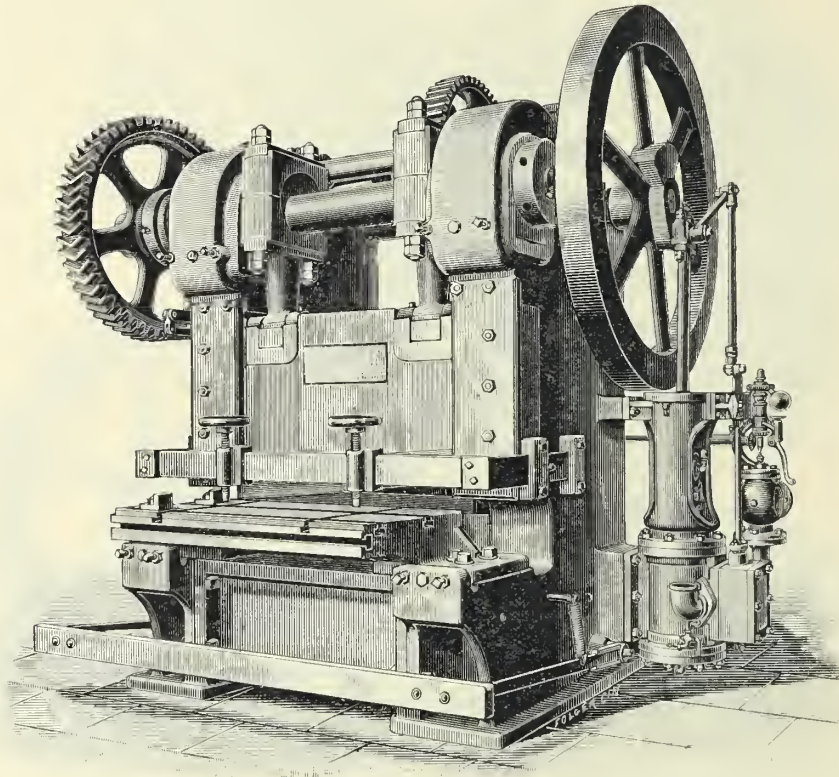


COMBINED PUNCH AND SHEAR—B.

THE above illustration is of the Combined Punch and Shear with Engine, which is built in different throat depths, with or without engine, single or double geared, to suit the various requirements of a heavy metal working tool. The cut shows same as a shear for cutting 5 inch axles or its equivalent and arranged for shearing plates up to $1\frac{1}{2}$ inch thick, or will punch $4\frac{1}{2}$ inch holes in $1\frac{1}{2}$ inch metal. With some slight changes in patterns it is built as a fish plate punch, also for punching up to six holes in heavy plates. Write for additional information and prices.

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FIG. 734.



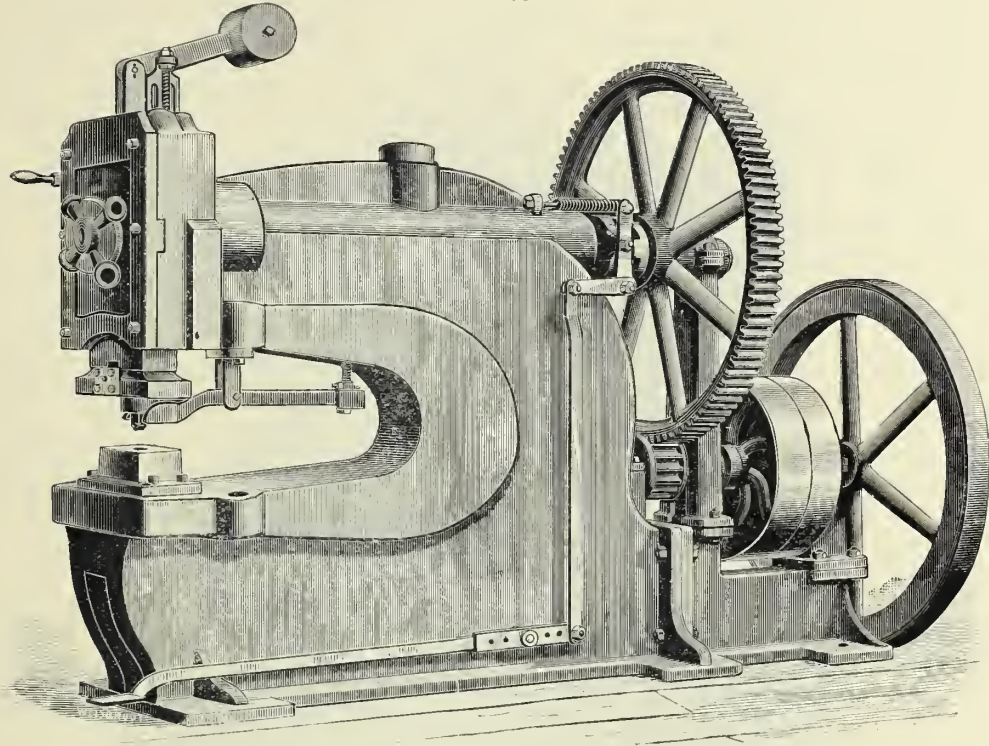
HEAVY PLATE SHEAR.

THE above cut represents the latest improved Heavy Plate Shear, with Engine, throat 9 inches in depth, with capacity for shearing plates up to 1 inch in thickness. The machine may be built with or without engine, and of any width up to 10 feet, or with throat depth to suit requirements.

This pattern is also used for Multiple Punch Machine for punching any number of holes in heavy plates. It is equipped with all necessary gauges, brackets and wrenches. Further information, prices, etc., on application.

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FIG. 735.



42-INCH THROAT BOILER MAKERS' PUNCH.

THE accompanying illustration represents a 42-Inch Throat, similar in design to the No. 0 punches or shears shown on page 540 of this catalogue. These machines are all of a heavy and of a substantial design, self-contained, well proportioned and amply strong for their specified duty. The metal is well distributed, and wearing surfaces are large. All parts are constructed of the best material, and fitting and workmanship the best.

When both punching and shearing tools are supplied, either can be removed from the machine and the other substituted in a few minutes.

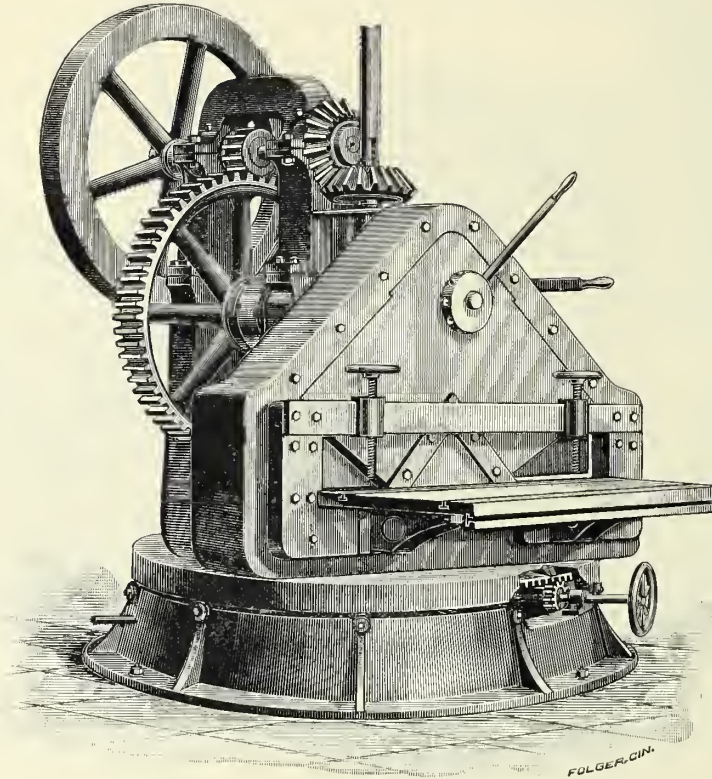
The engines supplied with these machines are of an extra heavy type and especially designed for the purpose.

Throats of different forms can be furnished to suit ordinary and special punching and shearing, and we illustrate a few of these types on page 601, which can be applied to machines of shallow or deep throats.

In naming price upon a complete machine of any size, we include one set of either standard or extension punching attachments, including one punch and die of any size up to the given capacity of the machine, or one set of shear knives and blocks, for plate or bar iron, or their equivalent.

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FIG. 736.



TURRET MOUNTED ANGLE SHEAR.

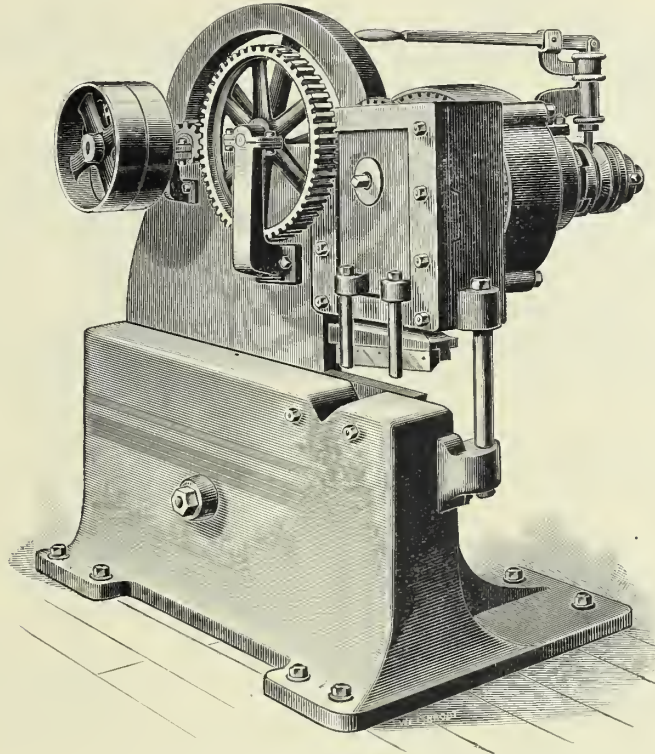
THE illustration shows an Angle Iron Shear of the latest design, turret mounted. Angles are at the present time being rolled in such long lengths, that in many cases they cannot be sheared on a stationary machine, especially when the shop is narrow and space limited for shifting the material to be cut.

The lower part or base of the machine is stationary, the upper part is rotary, and is driven by hand wheel at right of machine and bevel gear in connection with the top part, revolving to any desired angle. The lever on the left hand side is used as a brake, and holds the machine secure and firm in any position required. The machine is driven by overhead countershaft and bevel gears. All working parts are constructed of the best materials and fitted to insure durability, strength and adjustment. An iron table with gauge and index for the different angles is furnished. The above machine will cut angles 6 x 6 inches and $\frac{3}{4}$ inches without any shear in the blades.

This machine can also be furnished driven by independent engine.

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FIG. 737.



UNIVERSAL GEARED POWER SHEAR.

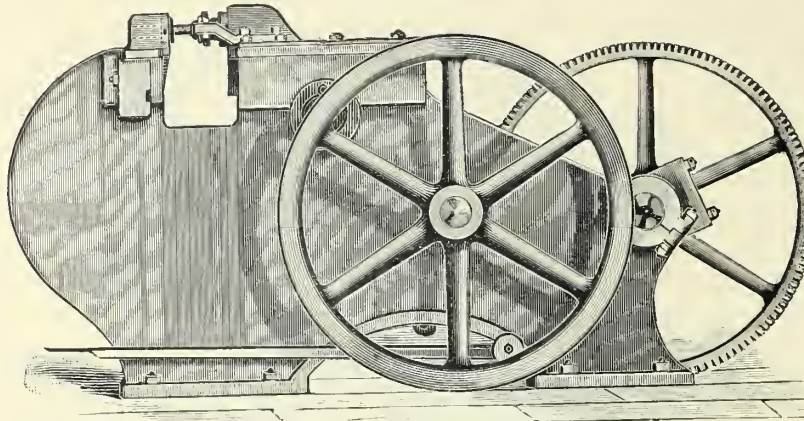
THIS cut illustrates the Double Geared Universal Power Shear for cutting $\frac{1}{2}$ inch plates. By carefully examining the construction of this machine, you will observe that the gearing is so arranged that the operator can get close up to his work and yet be in no danger from the teeth of the gearing, which device is not possessed by machines of this class of other makes. The front gear is encased and fastened to the housing in a most substantial manner. The clutch is automatic and stops when the knife is at highest point. It can be operated from most any position, the lever being almost universal. The above superior advantages will commend themselves to all practical mechanics. This size machine will shear $\frac{1}{2}$ inch plate. Bars, 4 inches by $\frac{1}{2}$ inch. Angles, $3\frac{1}{2} \times 3\frac{1}{2}$ inches.

The machine is also built in sizes to cut $\frac{5}{8}$ and $\frac{3}{4}$ inch plates. Pulley driven or engine driven.

Weight, with pulleys,	.	Price, with pulleys,	.
“ “ engine,	.	“ “ engine,	.

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FIG. 738.



IMPROVED HORIZONTAL FLANGE PUNCH.

THE advantages of this design of machine will be fully appreciated by all boiler makers and iron bridge builders, the gearing and fly-wheel being below the top of the machine, leaves it perfectly clear, so that flanges, heads or crooked furnace plates, as well as bent angle iron or tee iron, may be punched from either the inside or outside, thus saving a vast amount of labor. A hand wheel is provided for placing the punch to the center mark on the work, before throwing in the clutch, so that accurate work may be done. Strippers are adjustable for all thicknesses of iron. Either hand or foot levers may be attached for operating, as preferred. These machines are built with different designs of nose and die seat, or die stake, applicable to all Horizontal Punches, both short and deep throat.

Deep Throat Horizontal Punches are particularly adapted for such work as punching brace or stay bolt holes in locomotive boilers.

The steel die stake is specially convenient for general flange work, in fact all close or crooked work, and are built in the following sizes :

- No. 1 will punch $\frac{7}{8}$ inch hole through $\frac{3}{4}$ inch iron, 6 inches from the edge. Weight, 6390 pounds. Price, \$
 - No. 2 will punch $1\frac{1}{8}$ inch hole through 1 inch iron, 9 inches from the edge. Weight, 9750 pounds. Price, \$
 - No. 3 will punch $1\frac{3}{8}$ inch hole through 1 inch iron, 9 inches from the edge. Weight, 14680 pounds. Price, \$
 - No. 4 will punch $1\frac{1}{4}$ inch hole through $1\frac{1}{4}$ inch iron, 12 inches from edge. Weight, 16000 pounds. Price, \$
- There is furnished with each machine one punch and die, one die block and one punch stock.

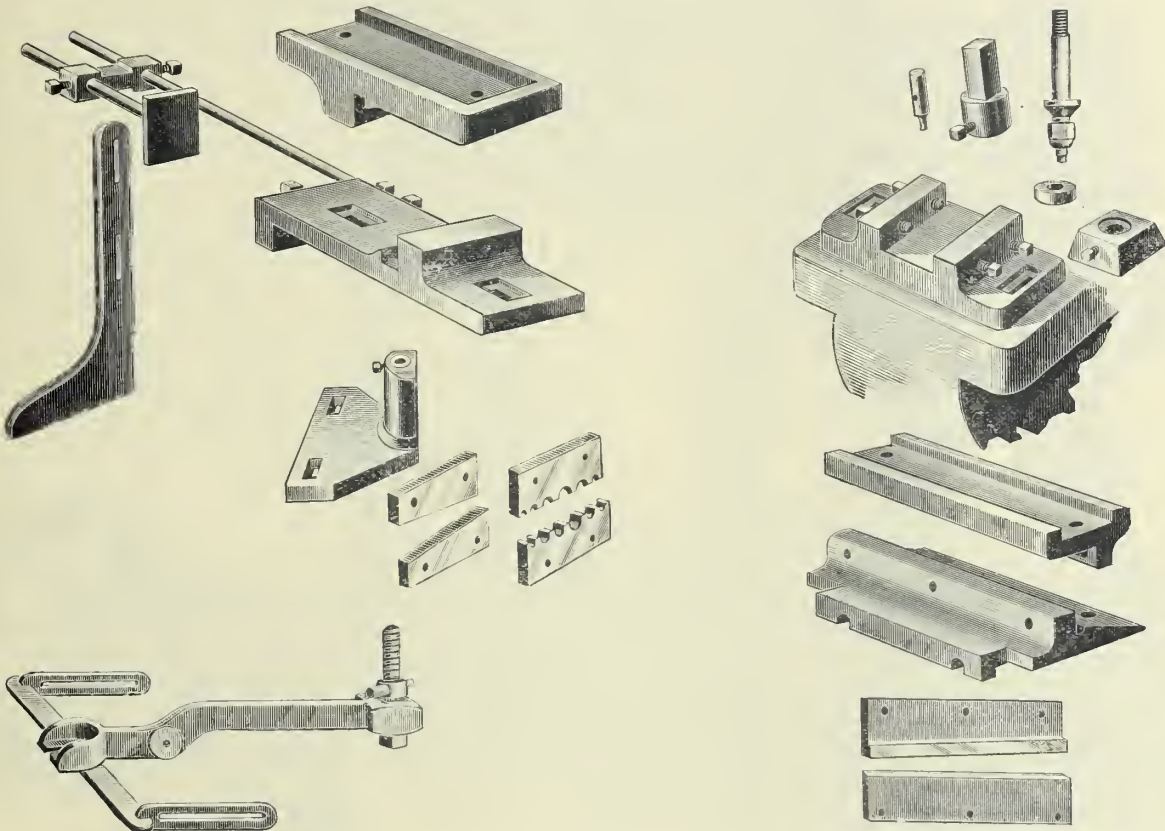
DEEP THROAT MACHINES.

- No. 5 will punch 1 inch hole through 1 inch iron, 18 inches from edge. Weight, 12500 pounds. Price, \$
- No. 6 will punch $1\frac{1}{4}$ inch hole through $\frac{3}{4}$ inch iron, 30 inches from edge. Weight, 14500 pounds. Price, \$
- No. 7 will punch $1\frac{1}{4}$ inch hole through $\frac{3}{4}$ inch iron, 36 inches from edge. Weight, 16900 pounds. Price, \$
- No. 8 will punch $1\frac{1}{4}$ inch hole through $\frac{3}{4}$ inch iron, 42 inches from edge. Weight, 19200 pounds. Price, \$

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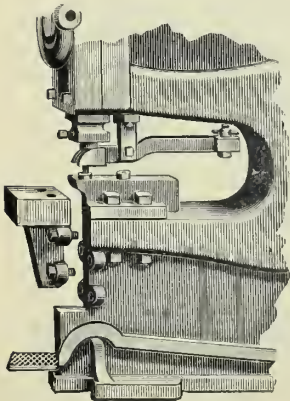
PUNCHING AND SHEARING TOOLS.

FIG. 739.



Illustrating cross-cut shear block with gauge, shear blades, strippers and gauges

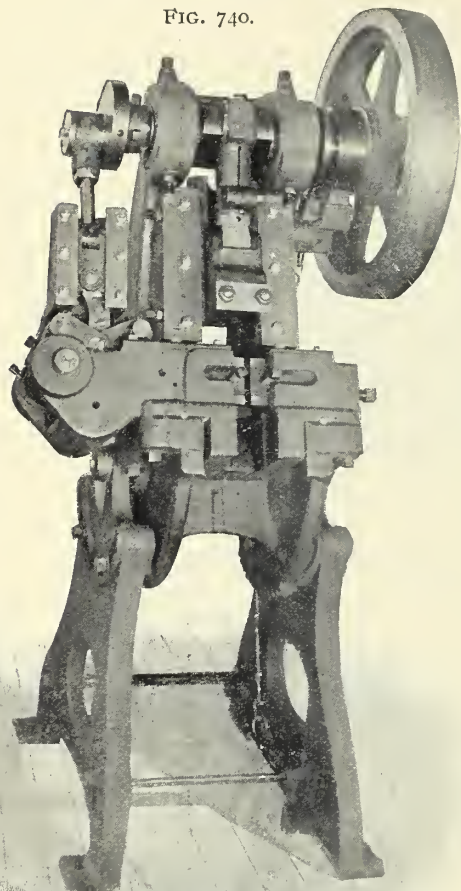
Illustrating die block with die rest and die, punch socket and punch, slitting shear block and shear blades. We furnish with each machine either cross-cut or slitting shear. Tools on double punch machines are interchangeable.



Sectional view of Punch Machine, showing removable lower jaw, so as to be able to punch close into the corners of angle iron, I beams and flanges.

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FIG. 740.



PRESSES WITH CLAMPING ATTACHMENT.

THE PRESS represented is the regular No. 3, inclinable, open back press with clamping attachment, adapting it for any work where a clamping action is required, such as heading, upsetting of rods, flanging of tubing, etc.

In the manufacture of bicycles it is used more particularly for upsetting the ends of break rods (a preceding operation to the flattening into eye shape), for flanging the ends of tubing for lap joints, etc. The clamping attachment is self-contained and can be easily removed. Without it, the press can be used for regular press work within its capacity.

The clamping device is of entirely new design, being operated by a system of toggle levers. Easier motions are obtained hereby, and the strain of clamping, instead of being transferred to the shaft, is taken up in the clamping device itself. Acts quicker than a hand clamp. Flanges tubing cold or hot. Saves time. Does uniform and perfect work. The press, with the attachment, is preferably used in an incline or horizontal position.

A fixture not shown on cut, for facilitating the inserting of work and gauging same properly, is furnished.

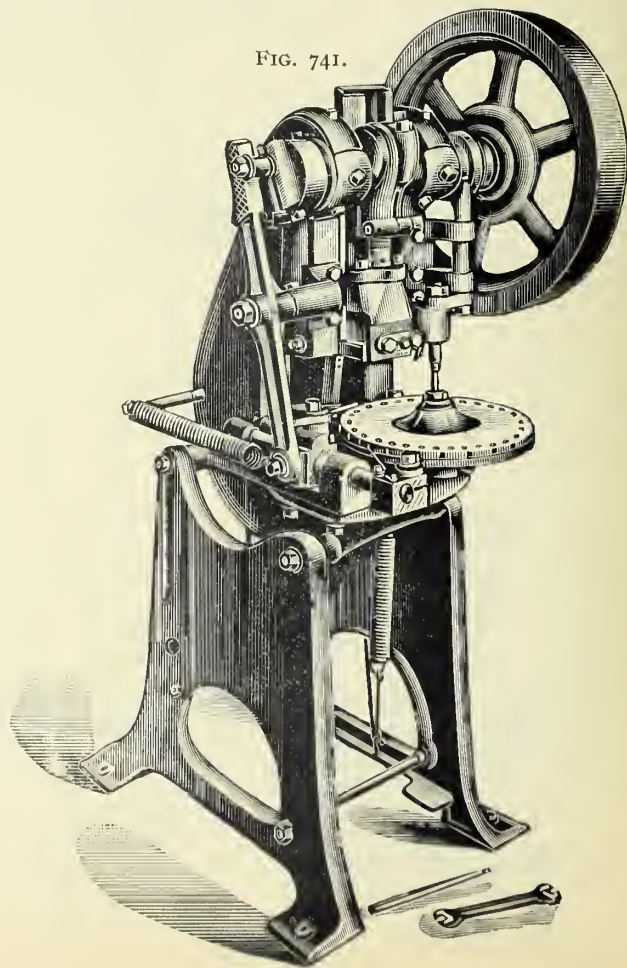
This attachment is built for No. 2 and No. 3 presses, and recommend the No. 3 for tubing larger than 1 inch in diameter.

Weight of No. 2 press, complete,	-	1400 pounds
Weight of No. 3 press, complete,	-	2200 pounds

AUTOMATIC DIAL POWER PRESS.

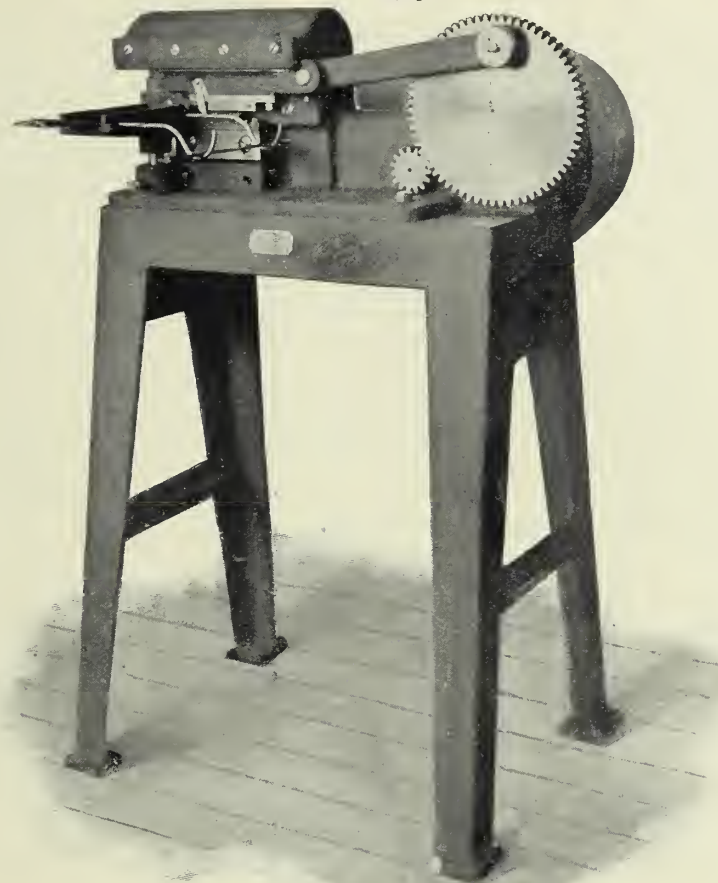
THIS MACHINE is especially designed for forming buttons, cartridge shells, and similar work in connection with a dial feed. We refer to the rigidity of frame, extra length of slide, handiness of manipulation, etc. It has a special mechanism for throwing off the connection between the wheel and shaft, and thereby stopping instantly the course of the slide should the dial fail to stand in its proper position when the punch is ready to do the work, consequently avoiding the damage which would result in case of the punch striking the dial in the wrong place.

FIG. 741.



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FIG. 743.



THREAD ROLLING MACHINE FOR SPOKES.

LARGE CAPACITY, CONVENIENCE OF FEEDING, SIMPLICITY OF DIES. FULL STRENGTH OF SPOKES RETAINED.

THE spoke is rolled between two dies—one stationary, one sliding. The dies are grooved, corresponding to the pitch and slope of the thread of the spoke. It is partially raised and partially depressed in the spoke, and as there is no metal removed, as by cutting, the full strength of the spoke is retained.

The spokes are placed in a small pan filled with oil (shown in front of the machine); for inserting they are pushed along in a corner groove, provided on the right-hand side of the pan, and are delivered by the machine in a depression of the two rail wires.

The part of the dies which is subject to wear and which has to be renewed, consists of a plain piece of $\frac{5}{8}$ -inch square steel. The thread of the spoke is not started the full length at once, but gradually, from the inside towards the end, thus giving the spoke a chance to stretch without injuring the die.

The horizontal construction has been adopted on account of its simplicity and convenience of inserting the spokes. Tests have proved its superiority.

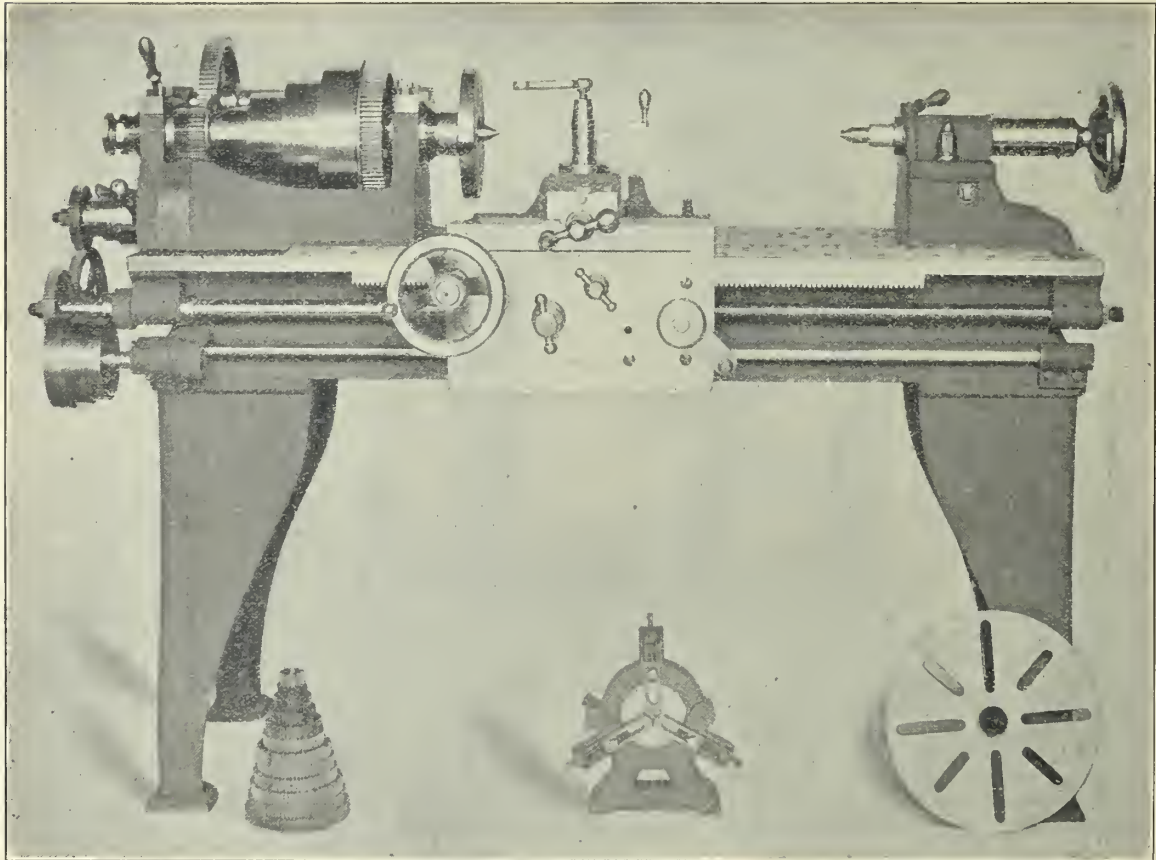
The capacity of the machine is only limited by the skill of the operator in feeding the spokes. We recommend a speed of 35 or 40 revolutions per minute.

SPECIFICATION.

Weight, complete,	600 pounds.
Size of tight and loose pulley,	12 x 3 inches.
Ratio of gearing,	6 to 1.

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FIG. 744.



14-INCH SWING SCREW CUTTING ENGINE LATHE.

SERIES "G."

THIS Lathe is a strictly high grade tool in every respect, being carefully designed, and built from entirely new and improved patterns comprehending the most acceptable and favorable features of the various modern makes, together with valuable improvements suggested to builder by years of experience in the manufacture of machine tools. The design is simple, and the adjustments are positive and most convenient for application.

The bearings are of liberal dimensions, and the various working parts are constructed to give uniform strength and utility throughout, and are all fitted with skillful accuracy by hand scraping; no grinding of any kind being given.

The bed is heavy and constructed to properly resist all required strain.

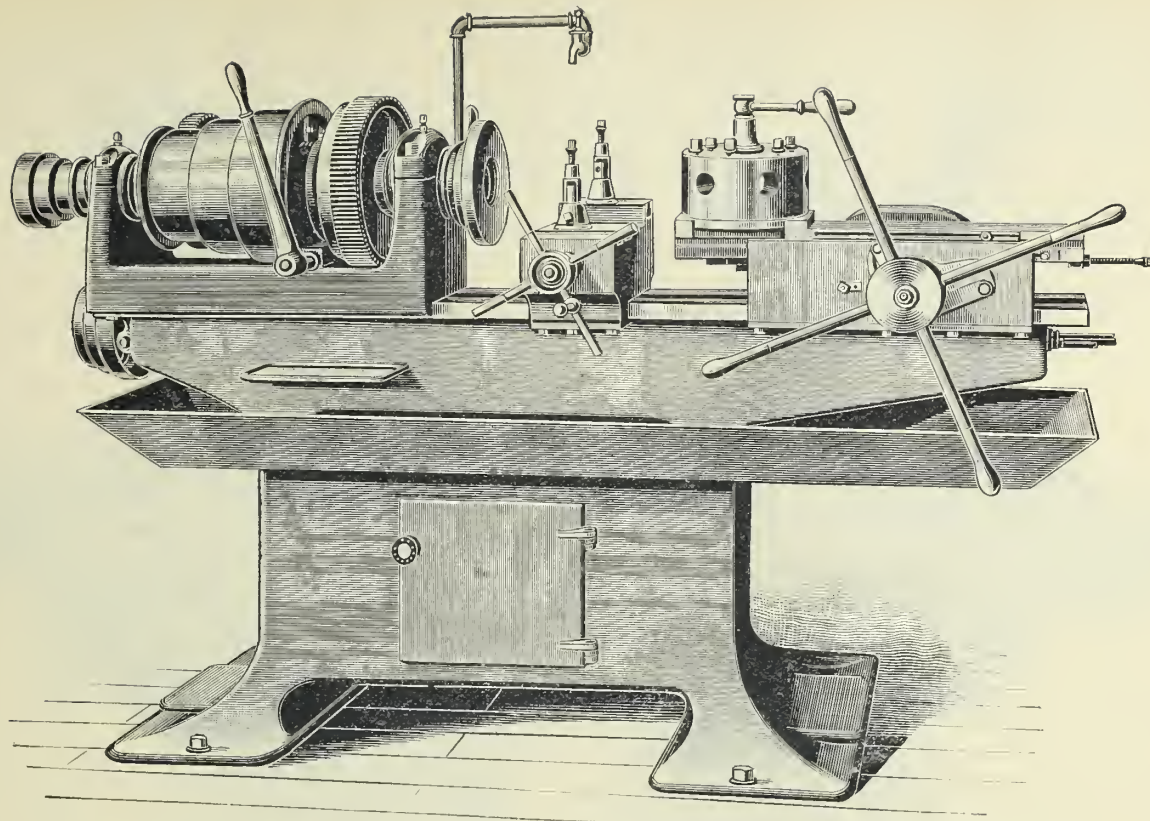
The hollow spindle is made of best crucible steel, with $1\frac{1}{16}$ inch bore entire length, with boxes of either bronze composition or iron casting, as may be preferred.

The feed screw, rods, studs and small gears are all made of selected steel, and all screws, nuts and wrenches are case-hardened. The feed rod and screw feed work independently or in conjunction; the screw feed having open and shut nut, which is readily operated by cam. Carriage and cross feed with plain gib rest, or raise and fall gib rest for cross feed can be furnished for a small additional charge. Each Lathe is furnished with large and small face plates, change gears and centre rest, also improved countershaft with friction pulleys.

DETAIL OF DIMENSIONS AND PRICES.

Length of Bed.	Swing Over Ways.	Swing Over Carriage.	From Centre to Centre.	Approximate Weight.	Price with Plain Gib Rest.	Price with Raise and Fall Gib Rest.	Per Foot Additional Length of Bed.
5 feet	14½ inches	8 inches	2 feet 3 inches	1050 pounds			
6 feet	14½ inches	8 inches	3 feet 3 inches	1150 pounds			\$10.00

Speed of countershaft, 125 revolutions per minute. Front bearing of spindle, 4 inches long, 2 3-16 inches diameter. Largest diameter of cone, 9 inches, taking 2¼ inch belt.



No. 5 FRICTION HEAD SCREW MACHINE, WITH POWER FEED TO TURRET.

THIS machine has been designed to meet the wants of our customers for a very heavy machine having ample belt power, and great stiffness of construction. Especial attention is called to the manner of securing both the head stock and turret fixture to the bed, and the construction of the bed for this purpose. The principal used is identical with the method universally employed on the tail stock of all engine lathes, and consists of springing the two sides of the lathe bed apart by means of a wedge drawn up with an eccentric of very short throw, this in combination with the flat gibs under the outside of both the turret and cut-off, make all parts, when secured, as nearly one piece as possible.

The turret has an extremely long base, and is carefully scraped to a fit, and provided with taper gibs for keeping in line. All the locking mechanism is of steel and hardened. We would also call attention to the simple construction and great durability of the friction geared head, the large diameter and wide face of all the gears, the ease with which all parts can be adjusted, and their accessibility.

The wide face and large diameter of the cones, ensure ample belt power for all cuts. The diameter of the bearings and the closeness of the work to the head stock are also good features.

The power feed has three changes of speed, and the stop motion is very accurate, and passes by in either direction.

The cut-off or cross slide is very heavy and rigid, and the rear tool is to be used in an inverted position to avoid reversing the machine. The stop motion is in the form of an index, and can be set to stop in either direction. The gears of the power feed are large in diameter, and the worm is of course pitch and self oiling. There is also a cover over all the exposed parts to prevent chips from getting into the gearing.

The oil pan is large and deep, and the oil tank is cast with the cabinet. The cabinet is provided with a door and shelves for the reception of tools and wrenches. There is an oil pump of the geared type, which will deliver a large amount of oil, and is not liable to get out of order.

PRINCIPAL DIMENSIONS, SPECIFICATION AND DESCRIPTION OF No. 5 FRICTION HEAD SCREW MACHINE WITH POWER FEED TO TURRET.

Diameter of hole in spindle, - - - - -	2 3/4 inches.	Length of bed, - - - - -	5 feet 7 inches.
Diameter of thread on spindle, - - - - -	3 3/8 "	Largest diameter of cone, - - - - -	13 "
Pitch of thread on spindle, - - - - -	12 "	Width of belt, - - - - -	4 1/8 "
Greatest distance between face of turret, and end of spindle, - - - - -	36 "	Diameter of pulleys on countershaft, - - - - -	14 "
Diameter of turret, - - - - -	9 1/2 "	Width of belt on countershaft, - - - - -	4 1/8 "
Diameter of holes in turret, - - - - -	1 1/4 "	Countershaft, speed of, - - - - -	160 revolutions.
Distance from centre of holes in turret to top of slide, - - - - -	3 1/2 "	Gives spindle speed of, - - - - -	330, 210, 130
Length that can be milled, - - - - -	12 "	Gives spindle speed with back gears of, - - - - -	65, 40, 25
		Floor space of machine, - - - - -	7 ft. x 2 ft. 4 in.
		Weight ready for shipment, - - - - -	3,300 pounds.

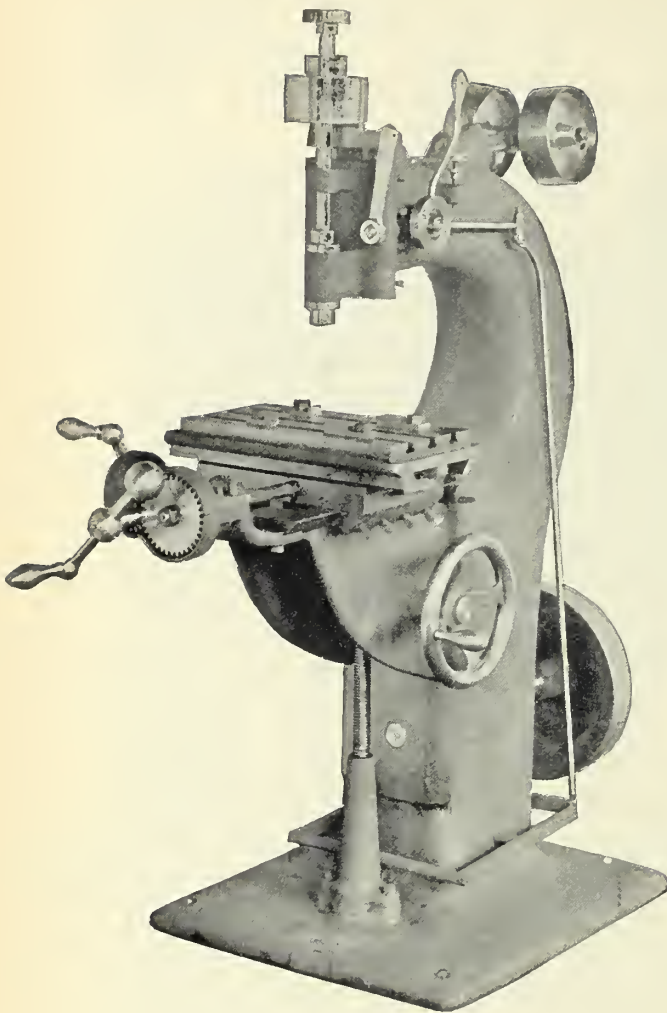
Attachments and variations may be furnished as follows: Without power feed. With any kind of chuck on end of spindle. With wire feed and automatic chuck. With oiling device for forcing oil through hollow drills while in the turret, as well as the oiling fixture usually provided.

PRICE LIST OF ATTACHMENTS AND EXTRAS.

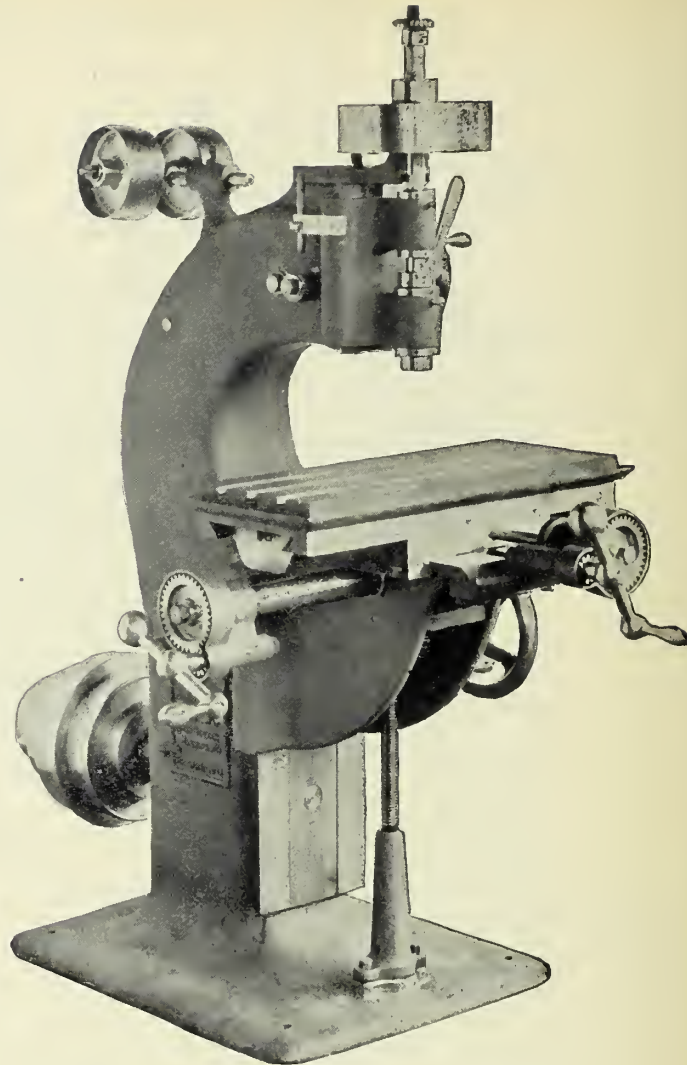
Friction head extra above plain head, - - - - -	\$200 00	Power feed to turret, - - - - -	\$55 00
Plain screw cut-off, - - - - -	85 00	Wire feed and collet chuck, - - - - -	150 00
Lever and screw cut-off, - - - - -	100 00	Oil pump and fixtures plain, - - - - -	25 00
Lever cut-off, - - - - -	85 00	Oil pump and fixtures with turret drill oiler arranged to force oil through hollow drill, - - - - -	50 00
Forming attachment, - - - - -	250 00		

FIG. 747.

FIG. 746.



No. 2.



No. 3.

PROFILING MACHINE, No. 3.

RACK FEED.

FOR PROFILING with guide pin, and rapid handling of work, the rack and pinion method of feed is the best. This machine is well adapted for use in bicycle shops, gun and sewing machine factories, for rapid duplication of parts.

Spindle has long bearings, boxes provided with means of adjustment. Diameter of lower bearing, $1\frac{1}{2}$ inches. Is made of tool steel hardened and finished by grinding. Tools fastened by draw-bar through centre of spindle.

Head has vertical movement of 4 inches fed through compound gearing, with finely graduated stop-gauge.

Spindle pulley is 10 inches diameter, 3 inch face, independently mounted upon an adjustable anti-friction bearing (patented), by which means the spindle is relieved from belt strain, giving high spindle speed and preventing overheating of bearings.

Table has working surface of 27 inches by 10 inches. Handles are adjustable to a higher or lower position to suit convenience of operator.

Vertical adjustment of knee is 16 inches. Greatest distance between end of spindle and table, 17 inches.

Swivel vise with graduated base, has gripping capacity of $7 \times 1\frac{1}{2} \times 4$ inches, steel faced.

Counter shaft has double friction clutch pulleys for 3 inch belt. Diameter of small pulley, 8 inches; of large pulley, 12 inches.

Speed of small pulley, 500 revolutions; of large pulley, 150 revolutions.

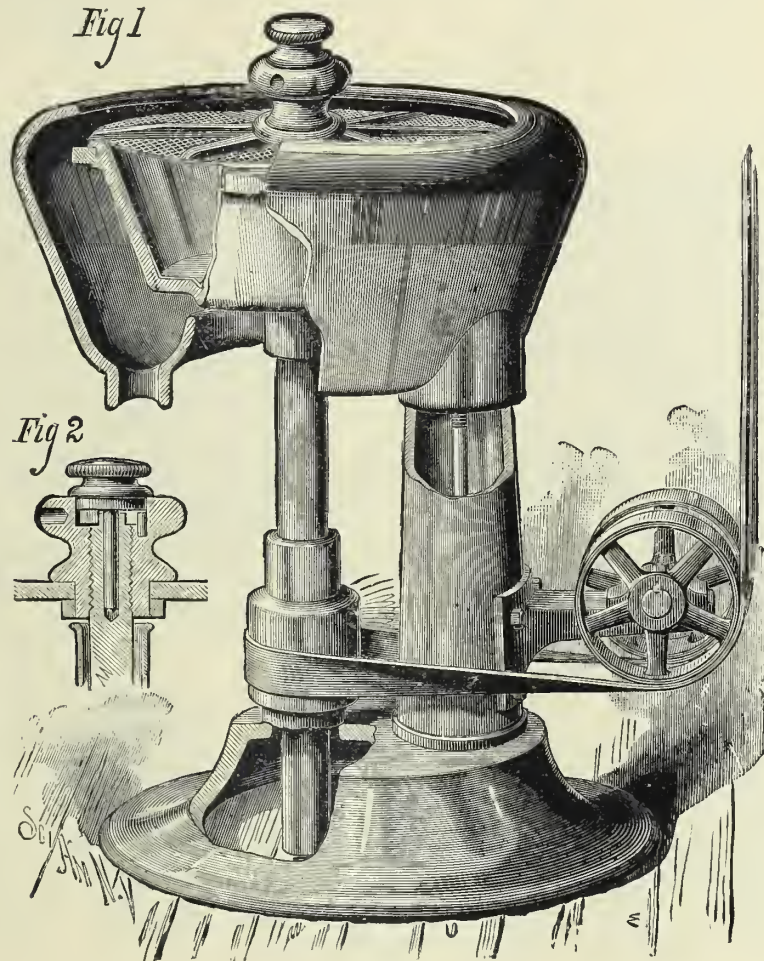
Cones have 3 steps, which with the two counter speeds will give six spindle speeds.

Price, including counter-shaft and wrenches, \$425.00; of swivel vise, \$30.00.

Weight boxed, about 1,750 pounds.

PRENTISS TOOL & SUPPLY CO.

FIG. 748.



No. 2.

CENTRIFUGAL OIL SEPARATOR.

THIS Oil Separator is designed to thoroughly and quickly remove the oil from metal turnings formed in the manufacture of bolts and screws, and from small articles such as screws, bolts, and nuts, which in their manufacture are coated with oil.

The Oil Separator is made in the best possible manner, will not get out of order, and is accompanied with countershaft and hangers. It is estimated by some who have used the machine that the saving of oil, in any manufacturing establishment consuming annually from eight to ten barrels of oil, will be amply sufficient to warrant and necessitate the purchase of an Oil Separator.

This revolving drum has within it a removable pan, in which the oily chips or turnings or screws are placed, the pan being removed to discharge its contents when the oil has been thrown off between it and the metal cover, locked down closely by a lock-nut. The oil discharged into the outer casing is delivered from an outlet into a suitable vessel, ready to be used over again.

The No. 1 Machine Pan is 15 inches across the top, 10 inches across the bottom, 5 inches deep. (Cut shown.)

The No. 2 Machine Pan is 22 inches across the top, 15 inches across the bottom, 10 inches deep.

The No. 2 machine is particularly adapted to light work of all kinds, such as light chips and punchings made in the manufacture of bicycles, etc.

Details and prices on application.

PRENTISS TOOL & SUPPLY CO.

FIG. 749.

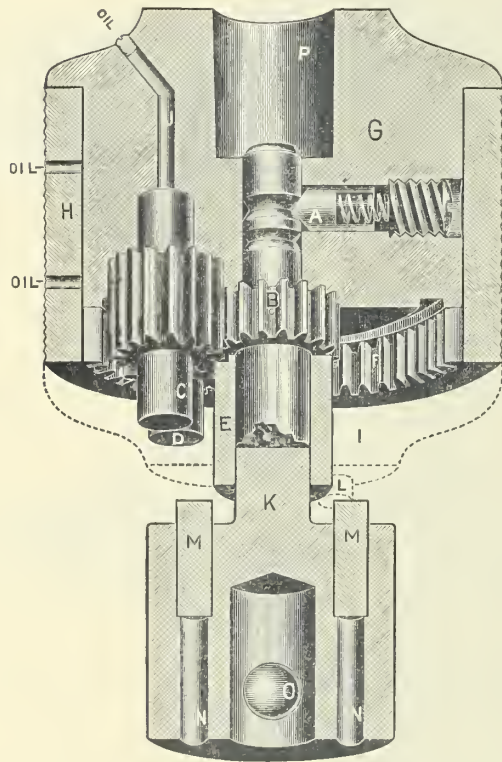
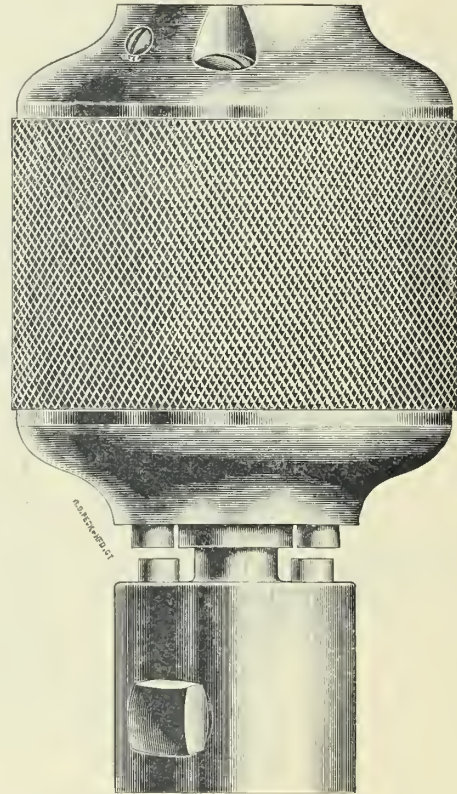


FIG. 750.



THE "IDEAL" REVERSING TAP HOLDER.

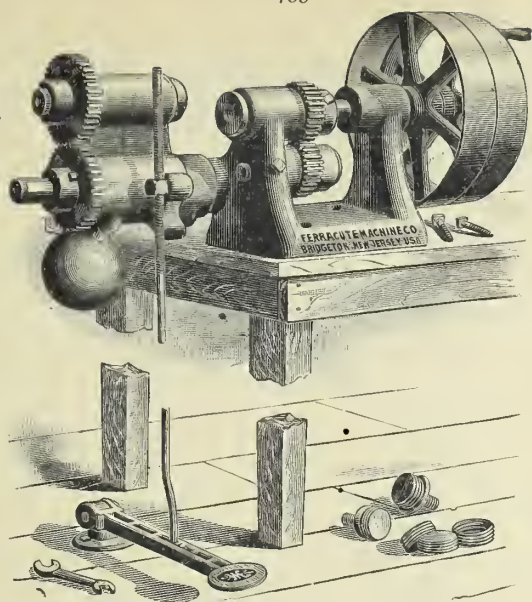
(PATENTED.)

THE only practical Reversing Tap Holder on the market that does not require a reversing belt or some special connection with the machine in which it is used to back the tap out of the work.

This Tap Holder is complete in itself, and when placed in the spindle of a drill press or lathe, just as you would place an ordinary drill chuck, you have a complete Tapping Machine ready for use.

It is well built of good material, and will tap all sizes to 7-16 of an inch in diameter.

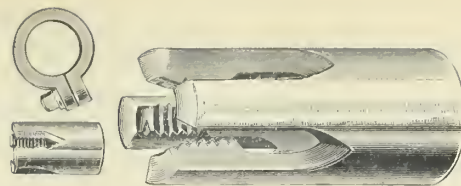
FIG. 755.



SCREW THREADING MACHINE.

Weight, - - 225 pounds Price, - - \$150.00
Capacity up to 5 inches diameter and 4 inches deep.

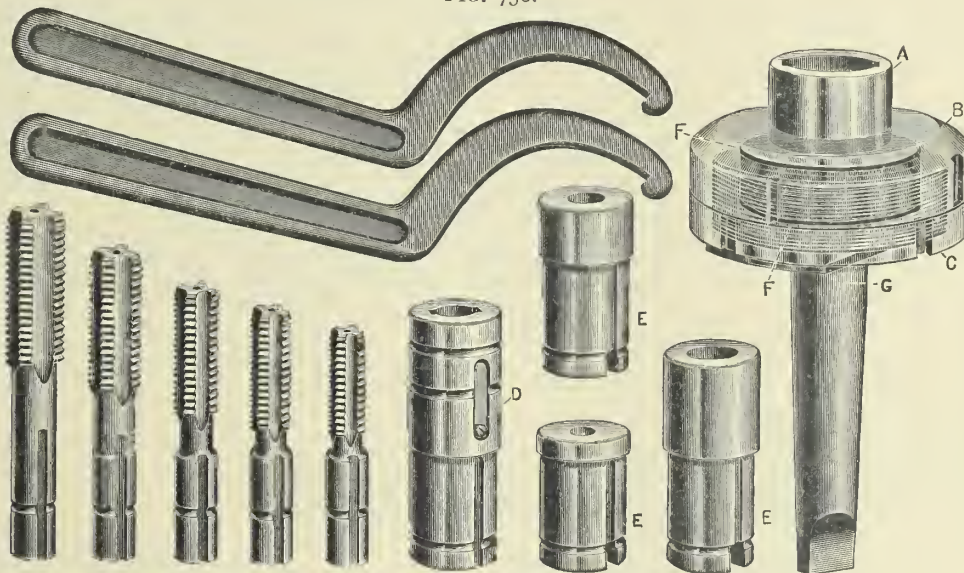
FIG. 755A.



SPRING SCREW THREADING DIE.

Diameter and Pitch of Screw.	Outside Diameter of Die.	Length of Die.	Price of Die.	Price of Clamp Collar.
$\frac{1}{8}$ 40, $\frac{3}{16}$ 32, $\frac{1}{4}$ 20	$\frac{1}{2}$ inch	1 $\frac{1}{4}$ inch	\$1.50	\$0.50
$\frac{1}{4}$ 20, $\frac{5}{16}$ 18, $\frac{3}{8}$ 16	$\frac{3}{4}$ inch	1 $\frac{3}{4}$ inch	1.75	.60
$\frac{3}{8}$ 16, $\frac{7}{16}$ 14, $\frac{1}{2}$ 13	1 inch	2 inches	2.00	.70
$\frac{5}{8}$ 11, $\frac{11}{16}$ 11, $\frac{3}{4}$ 10	1 $\frac{3}{8}$ inch	2 $\frac{1}{4}$ inches	2.00	.80
$\frac{3}{8}$ 16, $\frac{7}{16}$ 14, $\frac{1}{2}$ 13	1 $\frac{1}{4}$ inch	2 $\frac{1}{2}$ inches	2.00	.80
$\frac{9}{16}$ 12, $\frac{5}{8}$ 11, $\frac{3}{4}$ 10	1 $\frac{3}{8}$ inch	2 $\frac{1}{2}$ inches	2.40	1.00
$\frac{1}{2}$ 13, $\frac{5}{8}$ 12, $\frac{3}{4}$ 11	1 $\frac{5}{8}$ inch	2 $\frac{1}{2}$ inches	2.75	1.20
$\frac{3}{4}$ 10, $\frac{7}{8}$ 9, 1 $\frac{1}{8}$	2 inches	3 inches	3.50	1.50
$\frac{11}{16}$ 11, $\frac{3}{4}$ 10, $\frac{7}{8}$ 9, 1 $\frac{1}{8}$	2 $\frac{1}{2}$ inches	3 $\frac{1}{2}$ inches	5.00	2.50
$\frac{1}{2}$ 13, $\frac{5}{8}$ 12, $\frac{3}{4}$ 11	3 $\frac{1}{4}$ inches	4 inches	8.00	5.00

FIG. 756.



SAFETY DRILL AND TAP HOLDER.

ILLUSTRATES NO. 2 HOLDER AND TAPS.

THIS TOOL is intended for use in the upright drill, lathe, screw machine, or any machine with a revolving spindle. In construction the holder is very simple; there is nothing to break or get out of order, no complicated parts, and its operation is easily understood by the most ordinary mechanic. If properly used it is impossible to break either drill or tap, and the change from one to the other can be instantly made without stopping the machine.

The holder consists of a body, *G*, screw-threaded upon the outside and recessed to receive the friction socket, *A*, has taper shank regularly made to the Morse taper, but will be turned to any desired taper.

The friction socket, *A*, receives the drill sockets, *E*, or tap socket, *D*, and is held between two pieces of vulcanite fibre, *F*, and is driven by the friction obtained by tightening the friction cap, *B*, so that the friction produced will be sufficient to drive the drill or tap used, and when adjusted is held by the check nut, *C*.

The tap socket and taps being driven through feeders, prevents all danger of stripping the thread by careless hand feeding. All holes are tapped straight, and the tap being held loosely it does not cut larger than itself.

No. 0 holder takes drills or taps $\frac{1}{16}$ inch to $\frac{5}{16}$ inch, inclusive. Price, \$

No. 1 holder takes drills or taps $\frac{1}{4}$ inch to $\frac{3}{8}$ inch, inclusive, shank turned to No. 3 Morse taper, is furnished with one No. 1 Morse taper drill socket, two tap sockets and two spanner wrenches. Price, \$

No. 2 holder takes drills or taps $\frac{5}{8}$ to 1 $\frac{1}{4}$ inches, inclusive, shank is turned to No. 4 Morse taper, is furnished with one each Nos. 1, 2 and 3 Morse taper drill sockets, one tap socket and two spanner wrenches. Price, \$

No. 3 holder for taps 1 $\frac{1}{4}$ to 2 $\frac{1}{2}$ inches, inclusive, shank No. 6 Morse taper. Price, \$

FIG. 757.

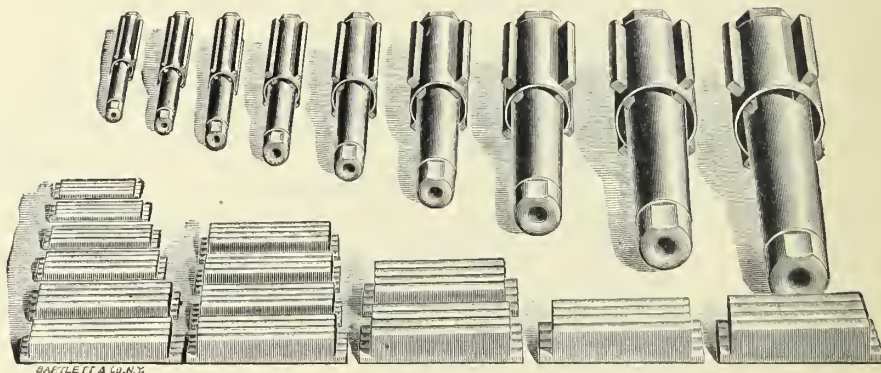


PATENT EXPANDING LATHE MANDRELS.

No.	Expansion.	Length of Arbor.	Length of Jaw Bearing.	Prices.	
00	$\frac{3}{4}$ to $\frac{7}{8}$ inch	6 inches	$1\frac{3}{4}$ inches	\$5.00	Special.
0	$\frac{7}{8}$ to 1 inch	$6\frac{1}{2}$ inches	2 inches	6.00	
1	1 to $1\frac{1}{4}$ inches	$7\frac{1}{4}$ inches	$2\frac{1}{2}$ inches	9.00	
2	$1\frac{1}{4}$ to $1\frac{9}{16}$ inches	9 inches	3 inches	10.50	\$125.00.
3	$1\frac{9}{16}$ to 2 inches	$11\frac{1}{8}$ inches	$3\frac{1}{2}$ inches	14.50	
4	2 to $2\frac{1}{2}$ inches	14 inches	5 inches	20.00	
5	$2\frac{1}{2}$ to $3\frac{7}{8}$ inches	$14\frac{3}{4}$ inches	$5\frac{3}{4}$ inches	32.00	
6	$3\frac{7}{8}$ to 4 inches	16 inches	6 inches	39.00	\$125.00.
7	4 to $4\frac{29}{32}$ inches	18 inches	6 inches	40.00	
8	$4\frac{29}{32}$ to $5\frac{1}{8}$ inches	$19\frac{1}{2}$ inches	6 inches	41.25	
9	$5\frac{1}{8}$ to $7\frac{1}{8}$ inches	$20\frac{1}{2}$ inches	6 inches	43.75	Standard Set.

Set of 9 Mandrels takes any size hole from 1 to 7 inches. Best steel throughout. Hardened and ground.

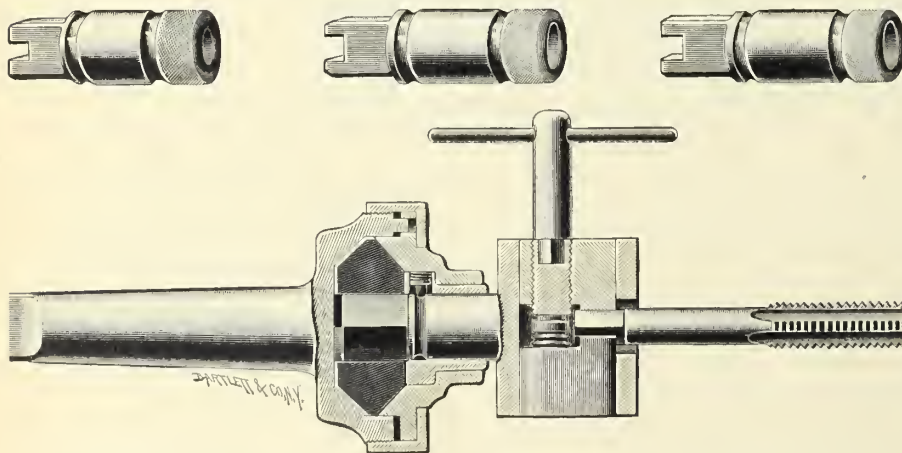
FIG. 758.



We furnish special Mandrels for pulley turning with longer arbors and jaws, and enlarged ends for carriers.

We furnish special Mandrels to take holes as large as 12 inches diameter of any length; Mandrels for turning eccentrics, work of tapered bore, nut facing.

FIG. 759.



STANDARD TAP AND DRILL CHUCK.

This Chuck is intended for use in the up-right drill, lathe and screw machine. In construction the Chuck is very simple. The cut illustrates No. 2 Chuck and Holder complete, and its construction can be easily understood by the most ordinary mechanic.

The taper shanks are regularly made to the Morse taper, but will be turned to any desired taper or to fit any screw machine.

The tap holder will take any standard tap, and the change from drill to tap can be instantly made without stopping the machine.

No. 1 Chuck takes drills or taps $\frac{1}{4}$ to $\frac{3}{4}$ inches, inclusive. Shank turned to No. 3 Morse

taper; is furnished with one Nos. 1 and 2 Morse taper drill socket, one tap holder and one spanner wrench. Price, \$25.00.

No. 2 Chuck takes taps or drills $\frac{5}{8}$ to $1\frac{1}{4}$ inches, inclusive, shank turned to No. 3 Morse taper; is furnished with one Nos. 1, 2 and 3 Morse taper drill socket, one tap holder and one spanner wrench. Price, \$35.00.

SCREW MACHINE AND TURRET LATHE TOOLS.

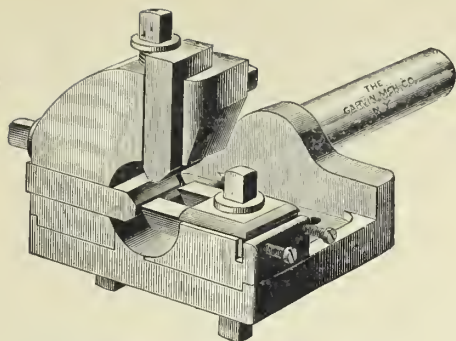


FIG. 760. Adjustable Box Tool.

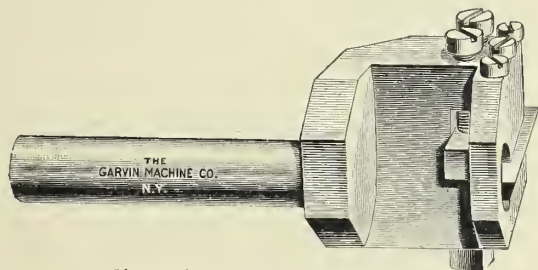


FIG. 761. Roughing Box Tool.

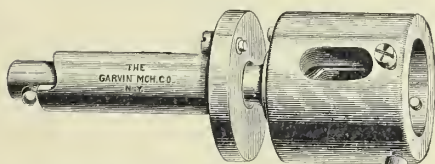


FIG. 762. Solid Shank Die Holder.

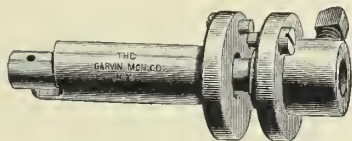


FIG. 763. Tap Holder.

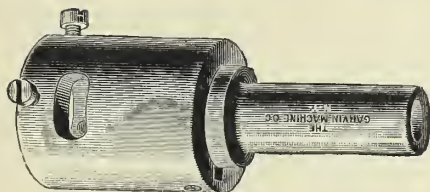


FIG. 764. Hollow Shank Die Holder.

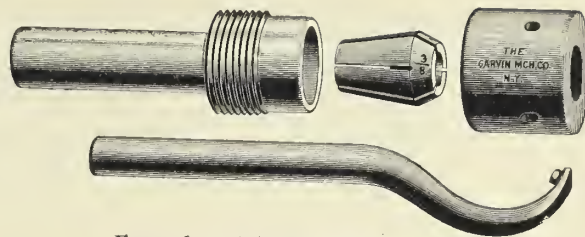


FIG. 765. Collet Chuck for Turret.

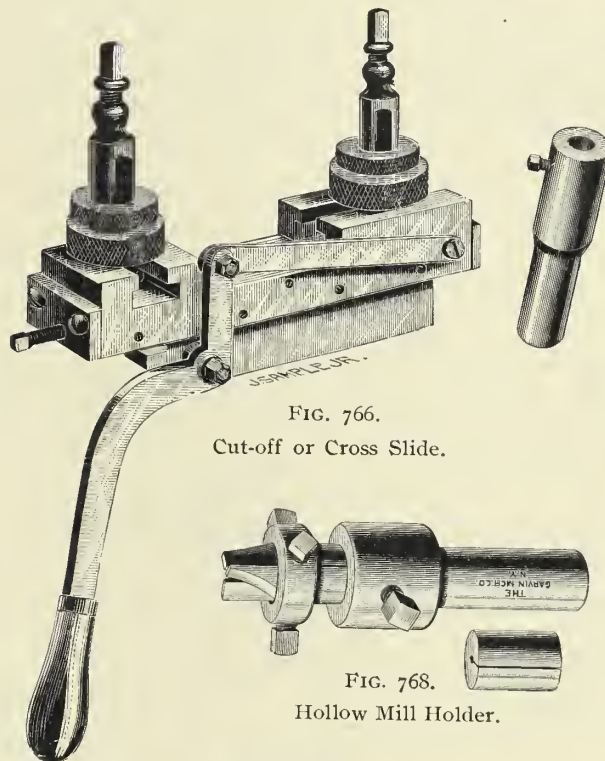


FIG. 766.
Cut-off or Cross Slide.

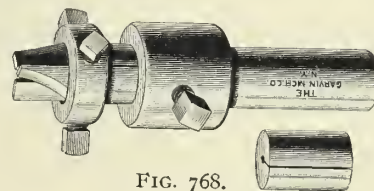


FIG. 768.
Hollow Mill Holder.

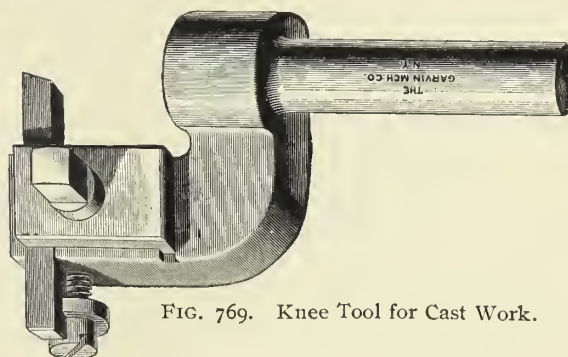


FIG. 769. Knee Tool for Cast Work.

FIG. 767. Plain Chucks or Collets.



FIG. 770.
Screw Chuck.



FIG. 771.
Crotch Center.



FIG. 772.
Drill Pad.



FIG. 773.
Point Center.



FIG. 774.
Cup Center.



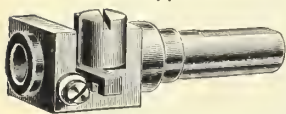
FIG. 775.
Spur Center.

PRENTISS TOOL & SUPPLY CO.

BOX CUTTER,

FOR TURRET CHUCKS AND SCREW MACHINES.

FIG. 776.



This is used on screw machines for taking off stock and turning to size in making studs and screws from round rods. The back end is reamed to fit a No. 1 mill holder, and the other fits turret of machine. The front end is fitted with a bushing,

that in all cases is adapted to the size of rod used.

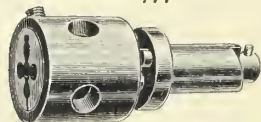
A cutter is held back of the bushing by a screw clamp, and is provided with a raising screw on the under side to adjust the cutting tool to the proper height. The cutter is easily set to cut $\frac{3}{8}$ inch stock down to any desired size at one cut, and when so set makes any number of pieces exact to any determined size and length. Each box tool is furnished with one bushing and one cutter, is all steel, and does the work of a whole set of hollow mills and lasts much longer.

Price, including one holder, as shown in cut, each, - - \$4.00

DIE HOLDER FOR TURRET.

This engraving shows a very convenient die holder for screw machine, or turret chuck. It is so constructed, that when properly set in machine, it will cut threads to a given point and revolve with the work when that point is reached, making it impossible to injure either the work or dies. Size for Reece or Carpenter dies, to cut $\frac{1}{4}$ inch and under, or machine screw numbers from 14 down.

FIG. 777.



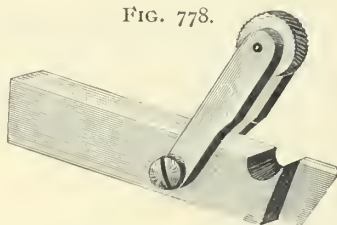
Price, - - - - - \$4.00
Smaller sizes for Elterich dies, - - - 3.50

TAP HOLDER.

The Tap Holder is made on the same principle as the die holder, to release automatically, when holes are tapped the desired depth. Holds taps with $\frac{1}{4}$ inch shanks.

Price, - - - - - \$3.50

FIG. 778.



NURLING TOOL COMBINED WITH CUTTING-OFF TOOL.

This is a very convenient tool and is sometimes equivalent to having a third tool post in cross slide, as articles can be formed by back tool, then nurlled and cut off with front tool.

Price, $\frac{5}{8} \times \frac{5}{8}$, - - - - - \$1.50
Price, $\frac{3}{4} \times \frac{3}{4}$, - - - - - 2.50
Price, $\frac{1}{2} \times 1$, - - - - - 4.00

SAW ARBORS.

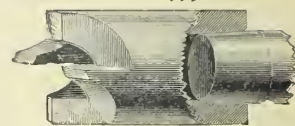
FOR USE IN THE LATHE FOR RUNNING SAWS, POLISHING WHEELS, ETC.

These arbors are made of steel with end hardened. The smaller sizes have steel collars. The sizes given are for the holes in saws or wheels to be used.

Size,	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1 inch.
Per doz.,	\$9.00	9.00	10.20	15.00	18.00	24.00	30.00
Each,	.75	.75	.85	1.25	1.50	2.00	2.50

IMPROVED END CUTTING HOLLOW MILLS.

FIG. 779.



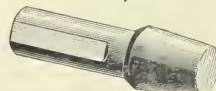
These Mills are made of best quality tool steel, fine finish and temper. The teeth have proper clearance and admit of grinding back $\frac{1}{4}$ to $\frac{1}{2}$ inch. They are an improvement over any formerly made, being provided with a tapered recess at the back end, adapting them for use on screw machines or turret lathes, by simply fitting one end of steel plug to inside of mill and the other end to turret, collet or chuck.

One plug of any of the following sizes will fit any mill of that size. Plugs can be bored to allow milled work to pass through. Mills are made in three regular outside sizes as per list. Other sizes to order.

No. 0 are made from stock $\frac{5}{8}$ inch diameter, $1\frac{1}{2}$ inch long.
No. 1 are made from stock $\frac{3}{4}$ inch diameter, $1\frac{3}{4}$ inch long.
No. 2 are made from stock $1\frac{1}{8}$ inch diameter, 2 inches long.
No. 0 cuts sizes from $\frac{1}{8}$ to $\frac{1}{4}$ inch by 64ths, No. 4 to 14 machine screw sizes, - per dozen, \$12.00
No. 1 cuts sizes from $\frac{1}{4}$ to $\frac{1}{2}$ inch by 32nds, per doz. 15.00
No. 2 cuts sizes from $\frac{3}{8}$ to $\frac{3}{4}$ inch by 32nds, per doz. 21.00

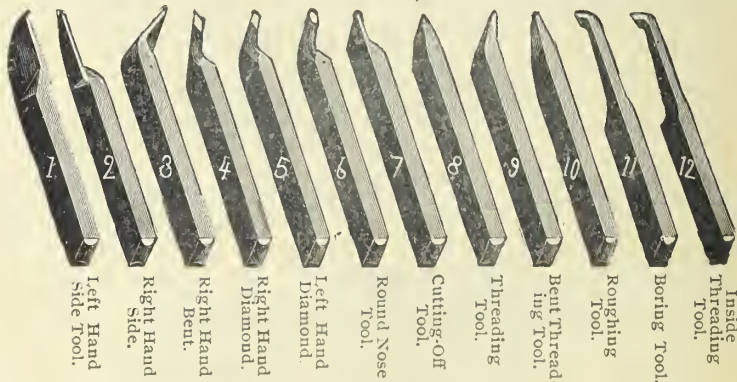
HOLDER FOR IMPROVED HOLLOW MILLS.

FIG. 780.



No. 0, each 35c. No. 1, 50c. No. 2, 75c.

FIG. 781.



LATHE TOOLS.

Price of full set of 12 turning tools, made of $\frac{3}{8} \times \frac{5}{8}$ inch steel, \$3.00
Price of single tool, .30
Price of full set of 12 turning tools, made of $\frac{3}{8} \times \frac{3}{4}$ inch steel, 3.75
Price of single tool, .35
Price of full set of 12 turning tools, made of $\frac{1}{2} \times 1$ inch steel, 6.00
Price of single tool, .55
 $\frac{3}{8} \times \frac{5}{8}$, 5 inches long; $\frac{3}{8} \times \frac{3}{4}$, 6 inches long; $\frac{1}{2} \times 1$, 7 inches long.

The above cut represents a full set of twelve turning tools for use in the engine lathe. Made from the best English cast steel, ground and tempered, ready for use. They are forged and tempered with special care, so they can be used until worn out without retempering.

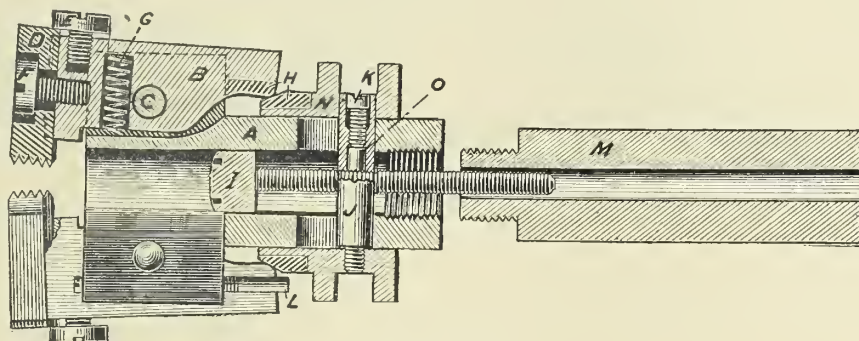
A full stock made from $\frac{3}{8} \times \frac{5}{8}$, $\frac{3}{8} \times \frac{3}{4}$, and $\frac{1}{2} \times 1$ inch, neatly put up in boxes, constantly on hand. Other sizes and special tools made to order.

PRENTISS TOOL & SUPPLY CO.

MISCHKE AUTOMATIC OPENING SCREW CUTTING CHUCKS.

THE engravings herewith represent the only chuck in the world that works automatically without any outside connecting attachment. By doing away with all stopping and reversing, it performs its work in less than half the time used by Monitor machines or lathes. It uses less oil and will not clog. It can be applied to any lathe or Monitor machine. It will cut any thread to any desired length with exactness. The dies outwear six of the ordinary kind, are easily sharpened, quickly changed, simple adjustment, and can be made by any toolmaker.

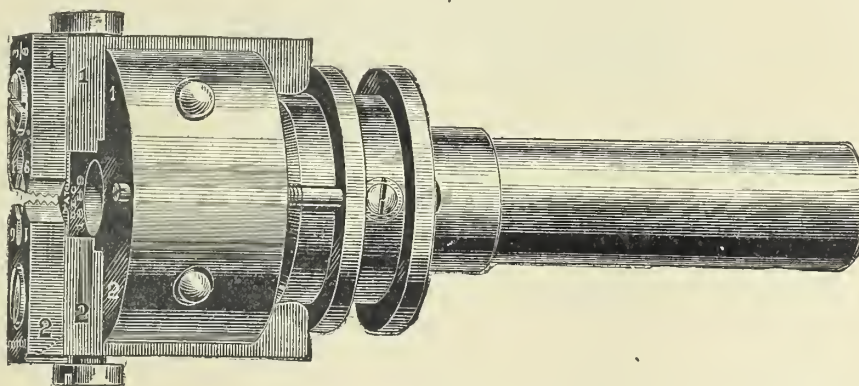
FIG. 719.



SECTIONAL VIEW.

To adjust the chuck for different lengths of thread, loosen set screw, *K*, and turn the gauge rod, *I*, with socket wrench to the desired distance from face of jaws. If longer screws are wanted than the length these chucks are made to cut, take out pieces marked *I*, *J* and *K*, and any desired length can be cut. The forward and backward motion of collar, *N*, which brings the dies to cutting position, can be accomplished by hand or arranged to work automatically by an outside attachment made to suit requirements. All parts of chuck subject to wear are made of the best tempered steel, and ample provision is made to provide for any possible wear.

FIG. 720.



SHOWING TWO JAWS.

SIZES AND PRICES.

			2 JAWS.	3 JAWS.
No. 1.	Any size up to $\frac{1}{8}$ inch ; any length to $1\frac{3}{8}$ inches,	- - - -	\$30.00	
No. 2.	Any size up to $\frac{1}{2}$ inch ; any length to $2\frac{1}{4}$ inches,	- - - -	35.00	\$40.00
No. 3.	Any size up to $\frac{3}{4}$ inch ; any length to $2\frac{1}{2}$ inches,	- - - -	45.00	50.00
No. 4.	Any size up to 1 inch ; any length to $3\frac{1}{2}$ inches,	- - - -		60.00

Above prices include one set of jaws.

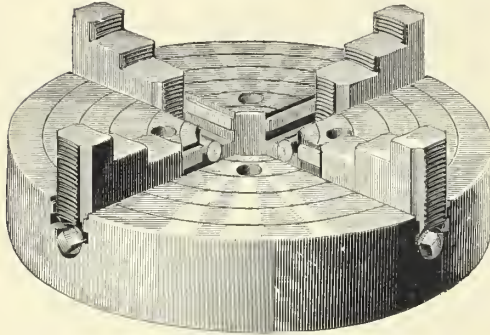
Extra set of dies (2 jaws) up to $\frac{1}{2}$ inch, \$2.00 ; blank dies, \$1.00.

Extra set of dies (3 jaws) up to 1 inch, 3.00 ; blank dies, 1.50.

PRENTISS TOOL & SUPPLY CO.

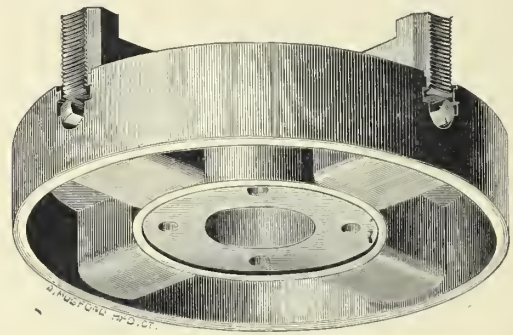
LATHE CHUCKS.

FIG. 721.



The above cut showing jaws reversible.

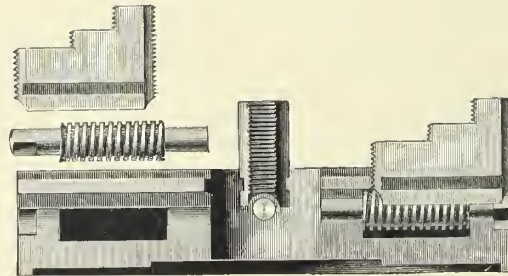
FIG. 722.



The above cut showing back view.

IMPROVED INDEPENDENT CHUCK.

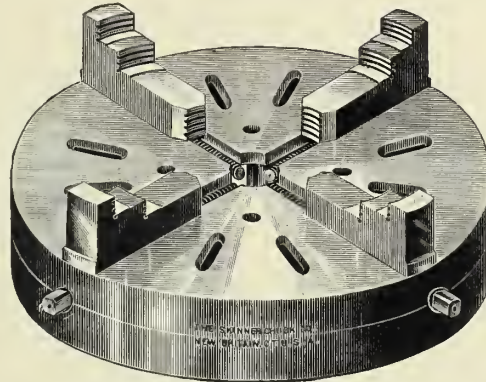
FIG. 723.



Sizes.	Diameter, including Projecting Pinion Head.	Weight.	Diameter of Hole through Center.	Diameter of Recess for Face Plate.	Capacity of Chuck.	Price.
4	4 $\frac{3}{4}$ inches	6 pounds	1 inch	3 $\frac{11}{16}$ inches	4 $\frac{1}{2}$ inches	\$14.00
6	6 $\frac{1}{2}$ inches	11 pounds	1 $\frac{3}{4}$ inches	5 $\frac{1}{8}$ inches	6 $\frac{3}{4}$ inches	18.00
8	8 $\frac{9}{16}$ inches	25 pounds	1 $\frac{7}{8}$ inches	5 $\frac{1}{2}$ inches	8 $\frac{3}{4}$ inches	22.00
10	10 $\frac{1}{2}$ inches	35 pounds	2 inches	5 $\frac{1}{2}$ inches	10 $\frac{3}{4}$ inches	26.00
12	12 $\frac{3}{4}$ inches	54 pounds	3 inches	7 $\frac{1}{16}$ inches	12 $\frac{3}{4}$ inches	30.00
14	14 $\frac{5}{8}$ inches	72 pounds	3 inches	7 $\frac{1}{16}$ inches	14 $\frac{3}{4}$ inches	34.00
15	15 $\frac{5}{8}$ inches	80 pounds	3 inches	7 $\frac{1}{16}$ inches	15 $\frac{3}{4}$ inches	35.00
16	16 $\frac{11}{16}$ inches	86 pounds	3 inches	7 $\frac{1}{16}$ inches	16 $\frac{3}{4}$ inches	38.00
18	18 $\frac{1}{2}$ inches	113 pounds	4 inches	8 inches	19 inches	44.00
20	20 $\frac{5}{8}$ inches	122 pounds	4 inches	8 inches	21 inches	50.00
22	22 $\frac{7}{8}$ inches	172 pounds	4 $\frac{3}{4}$ inches	10 inches	23 inches	57.00
24	24 $\frac{3}{4}$ inches	193 pounds	4 $\frac{3}{4}$ inches	10 inches	25 inches	65.00
30	30 $\frac{1}{8}$ inches	369 pounds	6 inches	15 inches	31 inches	120.00
36	36 $\frac{1}{2}$ inches	495 pounds	7 $\frac{1}{4}$ inches	18 inches	36 $\frac{3}{4}$ inches	210.00

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FIG. 724.



LIGHT INDEPENDENT LATHE CHUCK.

Fig. 724 is a front view of the 12 inch, all having slots in the body as here represented, which are a great convenience when parties desire to bolt work to the Chuck.

FIG. 725.

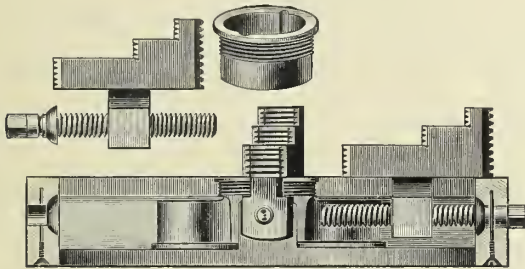


Fig. 725 shows a section of the 12 inch Light Independent Lathe Chuck, the center hub removed, also one of the jaws and jaw screws removed with jaw reversed. It also shows the small screw pins which hold the jaw screws in place when the center hub is removed for reversing the jaws. These screw pins may be quickly removed, affording an excellent opportunity for oiling the long bearing of the jaw screws. Attention is called to the reversible jaw with solid nut, and to the heavy ways in which the jaws work.

PRICE LIST OF FOUR JAW INDEPENDENT LATHE CHUCK.

WITH REVERSIBLE JAWS.

Diameter of Chuck Body.	Diameter of Hole Through Center.	Diameter of Recess for Face Plates.	Price.
4 $\frac{9}{16}$ inches	$\frac{3}{4}$ inch	2 $\frac{3}{4}$ inches	\$ 14.00
6 $\frac{7}{16}$ inches	1 $\frac{1}{4}$ inches	4 inches	18.00
8 inches	1 $\frac{1}{2}$ inches	4 inches	22.00
10 inches	1 $\frac{3}{4}$ inches	4 $\frac{3}{4}$ inches	26.00
12 $\frac{3}{8}$ inches	2 inches	6 inches	30.00
14 inches	2 $\frac{3}{8}$ inches	7 inches	34.00
16 inches	2 $\frac{3}{4}$ inches	7 $\frac{3}{4}$ inches	38.00
18 inches	3 inches	8 inches	44.00
20 inches	3 inches	10 inches	50.00
22 inches	3 inches	12 inches	57.00
24 inches	3 inches	12 inches	65.00
26 inches	3 inches	13 inches	80.00
28 inches	3 inches	14 inches	100.00
30 inches	3 $\frac{1}{4}$ inches	15 inches	120.00
36 inches	3 $\frac{3}{4}$ inches	18 inches	210.00
36 inches	3 $\frac{3}{4}$ inches	18 inches	240.00

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FIG. 728.

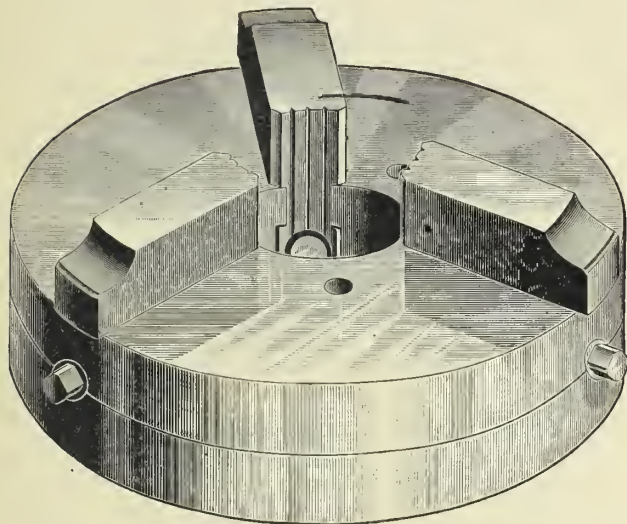
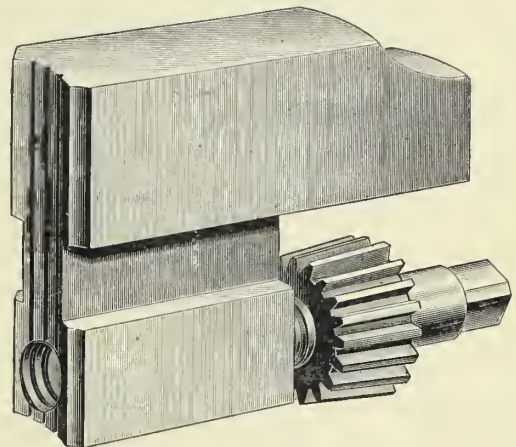


FIG. 729.



EXTRA HEAVY CUTTING-OFF CHUCK.

The above cut represents Extra Heavy Cutting-Off Chuck Jaw and Pinion. We can furnish this Chuck promptly, as we always carry them in stock. Prices: 11 inch, \$50.00; 14 inch, \$60.00; 17 inch, \$70.00.

DIMENSIONS.

	11	14	17
Diameter of body,	11 $\frac{1}{4}$ inches	14 $\frac{1}{16}$ inches	17 $\frac{1}{8}$ inches
Thickness of body,	2 $\frac{3}{4}$ inches	3 $\frac{1}{8}$ inches	3 $\frac{1}{8}$ inches
Hole through center,	3 $\frac{1}{8}$ inches	4 $\frac{1}{8}$ inches	5 $\frac{1}{8}$ inches
Diameter over all,	12 $\frac{1}{2}$ inches	15 $\frac{7}{16}$ inches	18 $\frac{5}{8}$ inches
Diameter of recess in back for face plate,	7 $\frac{1}{4}$ inches	8 $\frac{1}{2}$ inches	11 inches
Distance between centers of bolt holes,	5 $\frac{3}{8}$ inches	6 $\frac{1}{2}$ inches	8 $\frac{1}{2}$ inches
Thickness of shell,	1 $\frac{3}{16}$ inch	1 $\frac{7}{16}$ inch	1 $\frac{7}{16}$ inch
Diameter of driving screws,	1 $\frac{1}{16}$ inch	1 $\frac{1}{16}$ inch	1 $\frac{1}{16}$ inch
Distance from bottom of recess for lathe face plate to face of jaws,	4 $\frac{1}{4}$ inches	5 inches	5 inches
Width of jaws,	1 $\frac{1}{8}$ inch	1 $\frac{3}{4}$ inch	1 $\frac{3}{4}$ inch
Height of jaws above face of chuck,	1 $\frac{3}{4}$ inch	2 inches	2 inches
Holds work,	3 $\frac{3}{8}$ inches	4 $\frac{1}{2}$ inches	5 $\frac{1}{4}$ inches
Weight,	60 pounds	99 pounds	138 pounds

TWO-JAWED BOX BODY CHUCK.

WITH SLIP JAWS.

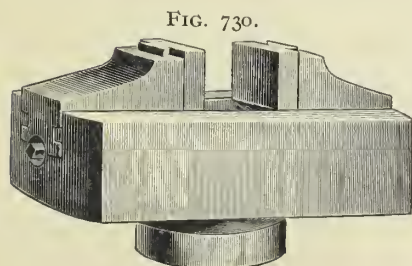


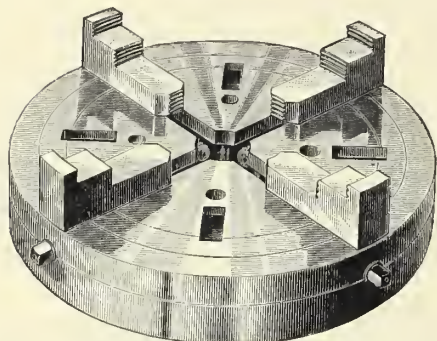
FIG. 730.

Size.	Jaws Take.	Price Box Body.	Extra Slip Jaws, Iron, Per Pair.	Cast Steel, Per Pair.
7 inches	3 inches	\$24.00	\$1.00	\$2.00
9 inches	4 inches	30.00	1.25	3.00
12 inches	6 inches	36.00	1.25	4.00
15 inches	8 inches	42.00	1.50	5.00

If desired, the jaws can be furnished to hold any special piece of work. Prices furnished upon application,

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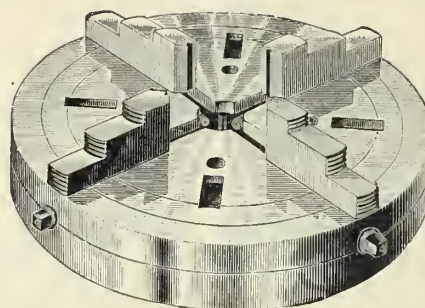
FIG. 731.



No. 11 UNIVERSAL LATHE CHUCK.

COMMON JAW.

FIG. 732.



No. 12 UNIVERSAL LATHE CHUCK.

REVERSE JAW.

The above cut represents a Universal Lathe Chuck, which we make in all sizes from 3 to 42 inches, inclusive. We guarantee this make of chuck equal to anything made.

We can furnish with two, three, or four jaws, as desired.

THREE JAWED CHUCKS.

Diameter.		Price.
3 inch chuck, three jaw, either style of jaw, -	-	\$18.00
4 inch chuck, three jaw, either style of jaw, -	-	22.00
6 inch chuck, three jaw, either style of jaw, -	-	26.00
9 inch chuck, three jaw, either style of jaw, -	-	34.00
12 inch chuck, three jaw, either style of jaw, -	-	44.00
15 inch chuck, three jaw, either style of jaw, -	-	52.00
18 inch chuck, three jaw, either style of jaw, -	-	62.00
21 inch chuck, three jaw, either style of jaw, -	-	80.00
24 inch chuck, three jaw, either style of jaw, -	-	100.00
30 inch chuck, three jaw, either style of jaw, -	-	170.00
36 inch chuck, three jaw, either style of jaw, -	-	230.00
42 inch chuck, three jaw, either style of jaw, -	-	270.00

The above cut represents a Universal Lathe Chuck with reverse jaw.

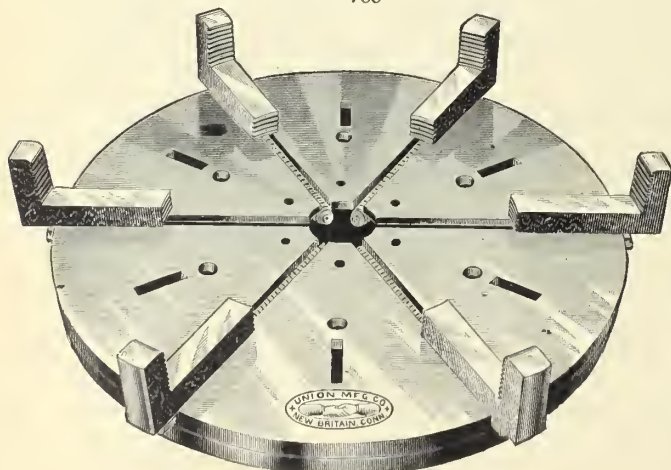
This chuck is used for holding rings, rods, pipe, drills, etc. It is an excellent chuck for brass finishing.

We can furnish with two, three and four jaws, as desired.

FOUR JAWED CHUCKS.

Diameter.		Price.
4 inch chuck, four jaw, either style of jaw, -	-	\$26.00
6 inch chuck, four jaw, either style of jaw, -	-	32.00
9 inch chuck, four jaw, either style of jaw, -	-	42.00
12 inch chuck, four jaw, either style of jaw, -	-	56.00
15 inch chuck, four jaw, either style of jaw, -	-	64.00
18 inch chuck, four jaw, either style of jaw, -	-	75.00
21 inch chuck, four jaw, either style of jaw, -	-	95.00
24 inch chuck, four jaw, either style of jaw, -	-	120.00
30 inch chuck, four jaw, either style of jaw, -	-	200.00
36 inch chuck, four jaw, either style of jaw, -	-	285.00
42 inch chuck, four jaw, either style of jaw, -	-	325.00

FIG. 733.



No. 25 IMPROVED SIX JAW CAR WHEEL CHUCK.

GENERAL DESCRIPTION.

This cut represents a Car Wheel Chuck, which is guaranteed to be equal to anything made.

It can be attached to a boring machine table or lathe, and is very useful for general machine work.

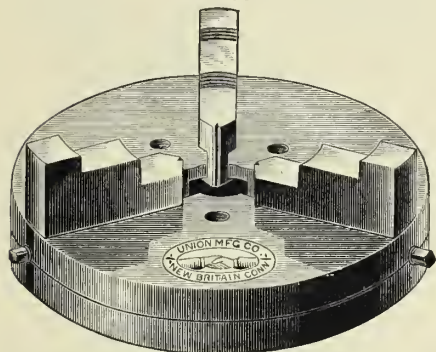
Car wheel chucks from 30 to 42 inches.

Diameter.		Price.
30 inch car wheel chucks, three jaw, -	-	\$185.00
36 inch car wheel chucks, three jaw, -	-	250.00
42 inch car wheel chucks, three jaw, -	-	300.00
42 inch car wheel chucks, six jaw (No. 25), -	-	400.00

We furnish car wheel chucks with six and eight jaws as desired. Special prices furnished on application.

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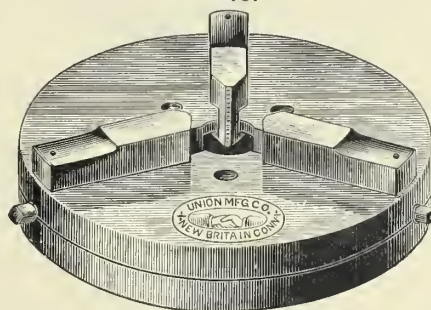
FIG. 734.



No. 1 COMMON JAW CHUCK.

This style of chuck is the one in general use. It has a large hole in the center, which will permit a reamer or drill to pass through work without injuring the chuck. The jaws are ground perfectly true on both face and bite.

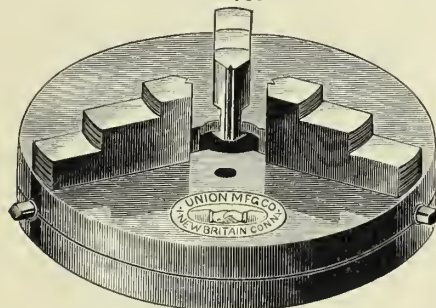
FIG. 737.



No. 4 INSIDE JAW CHUCK.

This chuck is used on milling machines and screw machines, etc. The holes in the center of these chucks are large enough in diameter to allow pipes or rods to pass entirely through the chuck. The bite of these jaws is on both sides of the pinion.

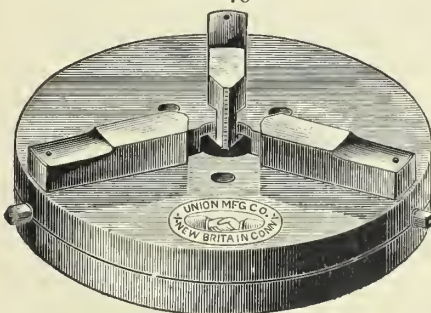
FIG. 735.



No. 2 REVERSE JAW CHUCK.

This chuck is used for holding rings, rods, pipe, drills, etc. It is an excellent chuck for brass finishing.

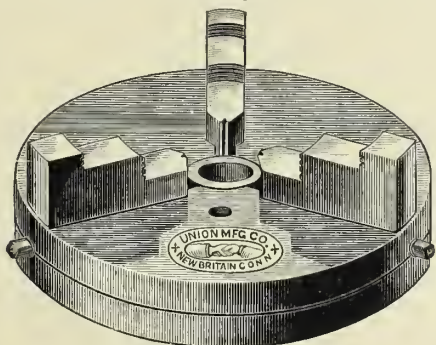
FIG. 738.



No. 5 CHUCK FOR CUTTING OFF LATHE.

This chuck is made for use on a cutting off lathe. The holes through the center of these chucks are extra large, so that pipes or rods will pass entirely through the chuck.

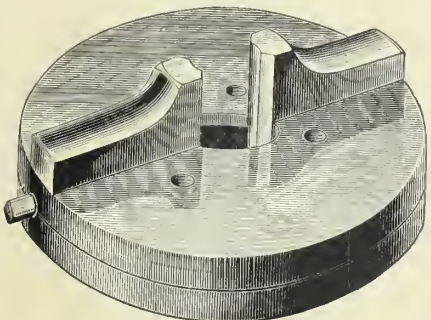
FIG. 736.



**No. 3 COMMON JAW CHUCK.
WITH REMOVABLE HUB.**

This chuck is the same as the No. 1 chuck, with the addition of the removable hub. When it is necessary to clean or oil the jaws the hub can be driven out without taking the chuck apart. Extra for removable hub, \$4.00, list.

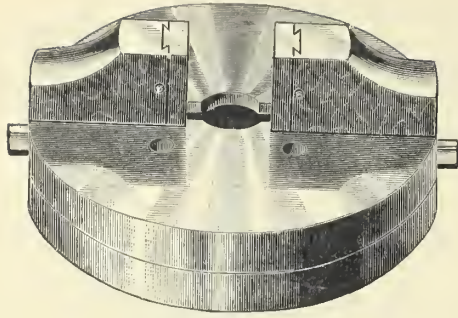
FIG. 739.



No. 6 TWO JAWED CHUCK.

The above cut represents a two jawed chuck, which is sometimes preferred to either the three jawed or four jawed chucks.

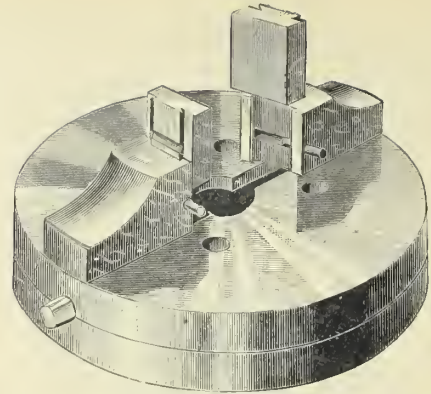
FIG. 740.



No. 7 TWO JAWED CHUCK.

The above cut represents a two jawed chuck with false jaw dovetailed into bite. We can furnish either universal, independent or union patent combination, as desired.

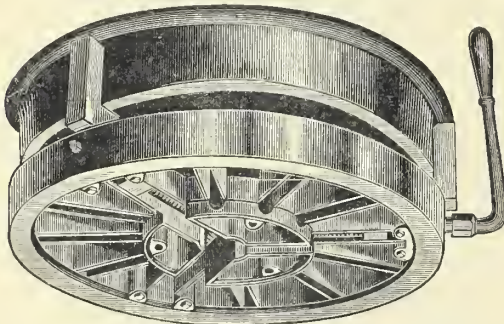
FIG. 741.



No. 8 TWO JAWED CHUCK.

This chuck is the same as No. 7, showing false jaw detached. Parties ordering should specify whether a universal, independent or combination chuck is wanted.

FIG. 742.

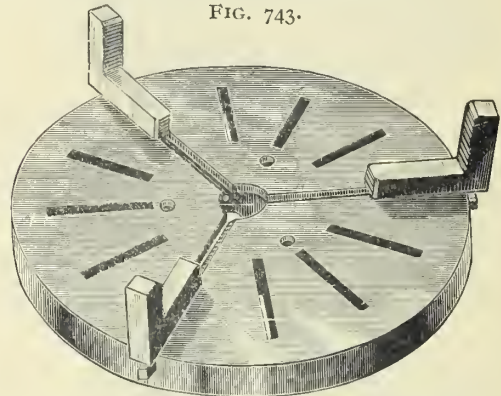


No. 9 UNION CAR WHEEL CHUCK.

The above cut represents a car wheel chuck with car wheel attached, and in position for boring.

We furnish car wheel chucks from 30 to 42 inches.

FIG. 743.



No. 10 UNION CAR WHEEL CHUCK.

The above cut represents a car wheel chuck, which is guaranteed to be equal to anything of the kind made. Sizes from 30 to 42 inches.

UNION COMBINATION CHUCKS.

INCLUDING BOLTS AND WRENCH. NOS. 1, 2, 3, 4 AND 5.

THREE JAWS.

Diameter.		Price.
3 inch chuck, three jaw, either style of jaw, - -		\$18.00
4 inch chuck, three jaw, either style of jaw, - -		22.00
6 inch chuck, three jaw, either style of jaw, - -		26.00
9 inch chuck, three jaw, either style of jaw, - -		34.00
12 inch chuck, three jaw, either style of jaw, - -		44.00
15 inch chuck, three jaw, either style of jaw, - -		52.00
18 inch chuck, three jaw, either style of jaw, - -		62.00
21 inch chuck, three jaw, either style of jaw, - -		80.00
24 inch chuck, three jaw, either style of jaw, - -		100.00
30 inch chuck, three jaw, either style of jaw, - -		170.00
36 inch chuck, three jaw, either style of jaw, - -		230.00
42 inch chuck, three jaw, either style of jaw, - -		270.00

FOUR JAWS.

4 inch chuck, four jaw, either style of jaw, - -	\$26.00
6 inch chuck, four jaw, either style of jaw, - -	32.00
9 inch chuck, four jaw, either style of jaw, - -	42.00
12 inch chuck, four jaw, either style of jaw, - -	56.00
15 inch chuck, four jaw, either style of jaw, - -	64.00
18 inch chuck, four jaw, either style of jaw, - -	75.00
21 inch chuck, four jaw, either style of jaw, - -	95.00
24 inch chuck, four jaw, either style of jaw, - -	120.00
30 inch chuck, four jaw, either style of jaw, - -	200.00
36 inch chuck, four jaw, either style of jaw, - -	285.00
42 inch chuck, four jaw, either style of jaw, - -	325.00

No. 6. TWO JAWS.

Diameter.		Price.
4 inch chuck, two jaws, - - - - -		\$20.00
6 inch chuck, two jaws, - - - - -		22.00
9 inch chuck, two jaws, - - - - -		30.00
12 inch chuck, two jaws, - - - - -		40.00
15 inch chuck, two jaws, - - - - -		48.00
18 inch chuck, two jaws, - - - - -		56.00
21 inch chuck, two jaws, - - - - -		74.00
24 inch chuck, two jaws, - - - - -		92.00

Nos. 7 and 8. TWO JAW CHUCK WITH FALSE JAWS.

4 inch chuck, two jaws, with one pair false jaws, -	\$22.00
6 inch chuck, two jaws, with one pair false jaws, -	24.00
9 inch chuck, two jaws, with one pair false jaws, -	32.00
12 inch chuck, two jaws, with one pair false jaws, -	42.00
15 inch chuck, two jaws, with one pair false jaws, -	50.00
False jaws for 4 inch chuck, regular size, per set, -	1.75
False jaws for 6 inch chuck, regular size, per set, -	2.00
False jaws for 9 inch chuck, regular size, per set, -	3.00
False jaws for 12 inch chuck, regular size, per set, -	3.50
False jaws for 15 inch chuck, regular size, per set, -	4.00

Nos. 9 and 10. CAR WHEEL CHUCKS.

30 inch car wheel chuck, three jaws, - - -	\$185.00
36 inch car wheel chuck, three jaws, - - -	250.00
42 inch car wheel chuck, three jaws, - - -	300.00

We furnish car wheel chucks with six and eight jaws, as desired. Special price furnished on application.

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WEIGHT AND DIMENSIONS OF CHUCKS

ARE AS FOLLOWS :

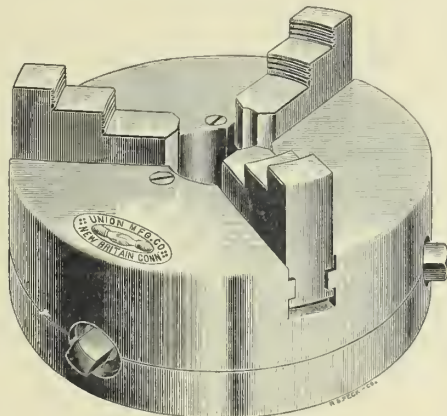
Sizes.	Diameter Including Projecting Pinion Heads.	Weight, Three Jaw.	Weight, Four Jaw.	Capacity of Chuck.	Diameter of Hole in Chuck.
4	5½ inches	7 pounds	7½ pounds	4½ inches	1½ inches
6	7¾ inches	15 pounds	16 pounds	6½ inches	1¾ inches
9	10⅞ inches	30½ pounds	32½ pounds	9¾ inches	1½ inches
12	13⅞ inches	47 pounds	51 pounds	12¾ inches	1¾ inches
15	16⅞ inches	66 pounds	74 pounds	15¾ inches	2 inches
18	18¾ inches	82½ pounds	90 pounds	19 inches	2¾ inches
21	20¾ inches	111 pounds	120 pounds	21¾ inches	2½ inches
24	22¾ inches	131½ pounds	144 pounds	24¾ inches	2¾ inches
30	29½ inches	290 pounds	297 pounds	31 inches	3½ inches
36	35 inches	390 pounds	400 pounds	37 inches	4 inches

Please compare the capacities and weights of these Chucks with other makes. In fitting Chucks to lathes, if the following directions are followed, there will be no complaint made regarding their accuracy.

Owing to the fact that many good Chucks are improperly mounted, and often condemned as inaccurate, the following is suggested :

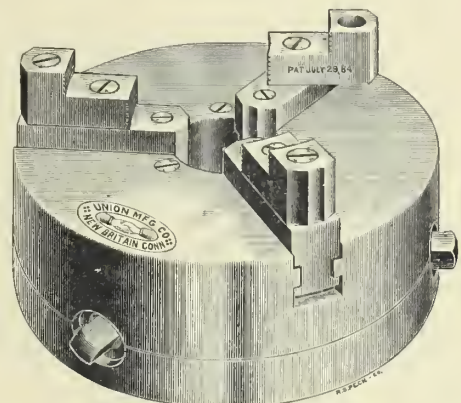
The face plate should be fitted and turned off true on the spindle of the lathe or machine on which the chuck is to be used ; have it fit perfectly the recess only in back of Chuck ; face off slightly concave, drill the bolt holes sufficiently large that there may be no cramping on them when the Chuck is bolted to it.

FIG. 744.



SOLID JAW.

FIG. 745.



REVERSIBLE JAW.

GEARED SCROLL CHUCKS.

It has been the endeavor to maintain in the construction of these Chucks, the same high standard of workmanship which is accorded to all the other lines. The best of material only has been made use of ; the working parts being of steel, the scroll being a solid steel forging.

There is also furnished with this line the patent reversible jaw, thus furnishing a chuck with one set of jaws that will answer every purpose, at the same time avoiding the necessity and expense of two sets of jaws.

This Chuck is furnished with the solid jaw, as shown in Fig. 744, and with either the inside or outside jaw, or both, if desired. We guarantee these Chucks in every particular, both as to workmanship and material, and carry a complete stock of all sizes.

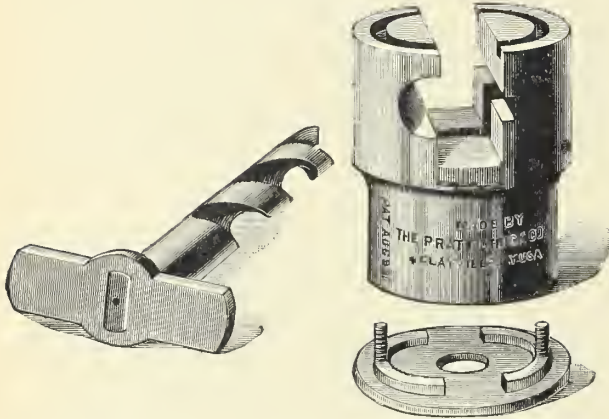
GENERAL DESCRIPTION.

Diameter.	Diameter of Hole.	Diameter of Face Plate.	Price Nos. 34 and 36.	Price No. 34 With Two Sets of Jaws.
2½ inches	⅝ inch	— inches	\$7.50	\$9.00
3 inches	⅝ inch	2⅞ inches	10.00	12.00
4 inches	¾ inch	3⅞ inches	12.00	14.40
5 inches	⅞ inch	3¾ inches	15.00	18.00
6 inches	1⅞ inch	4¾ inches	18.00	21.60

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PRATT'S PATENT POSITIVE DRIVING DRILL CHUCKS.

FIG. 746.



The above cut shows the chuck body and face plate, also the positive driver engaging the shank of drill.

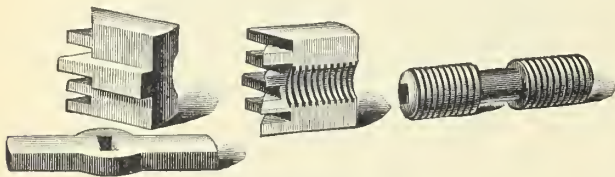
NOTE—That it is not necessary the end of drill should be flattened centrally; the recess in chuck body for driver permits the driver to adjust itself to any inaccuracy in this respect.

Also, it will drive equally well either right or left hand drills, reamers, taps, etc.

Aside from its advantages as a positive driving chuck, it is a most perfect and accurate friction chuck.

The leading drill manufacturers will furnish flattened end, straight shank drills for this chuck, when so ordered, without extra charge, and the driver will receive tapered taper shank drills without alteration.

FIG. 747.



The above cuts show the working parts of the chuck. The jaws and screw are carefully tempered and surface ground after tempering, thereby insuring perfect accuracy. No free emery is used in fitting these chucks.

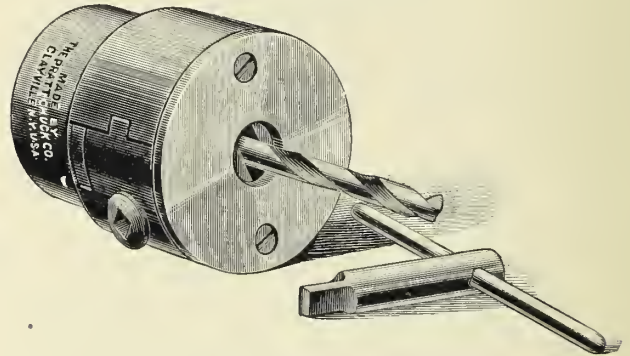
TAPER STEEL SPLIT SLEEVES.

One sleeve for No. 1 chuck holding taper drills, $\frac{1}{4}$ inch to $\frac{1\frac{1}{2}}{8}$ inch diameter,	\$0.25
Two sleeves for No. 2 chuck, holding taper drills, $\frac{1}{4}$ inch to $\frac{2\frac{3}{8}}{8}$ inch diameter,	.50
Three sleeves for No. 3 chuck, holding taper drills, $\frac{1}{4}$ inch to $1\frac{1}{4}$ inches diameter,	.85
Four sleeves for No. 4 chuck, holding taper drills, $\frac{1}{4}$ inch to 2 inches diameter,	1.55
Five sleeves for No. 5 chuck, holding taper drills, $\frac{1}{4}$ inch to $2\frac{1}{2}$ inches diameter,	2.55

Above applies to Morse and Standard tapers.

The above cuts show taper steel sleeve. Its application to taper shank drill is obvious. It enables the user of taper shank drills and other special tools to adopt the Pratt chuck without discarding his stock of drills.

FIG. 748.



The above cut shows the chuck assembled.

The hole in hub of chuck is bored to taper of $\frac{1}{2}$ inch per foot, and a spindle properly fitted and driven in will afford sufficient friction to hold the chuck without the aid of set screws or any auxiliary device.

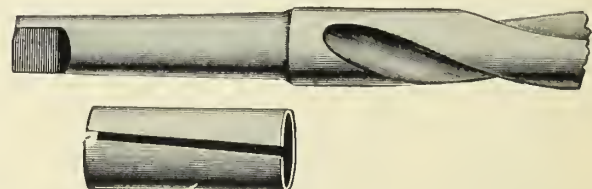
We will thread the hub of any chuck to fit any template furnished. Price, 75 cents each.

NOTE—The jaws of the chuck can be taken out without removing face plate.

PRATT'S PATENT IMPROVED DRILL CHUCKS.

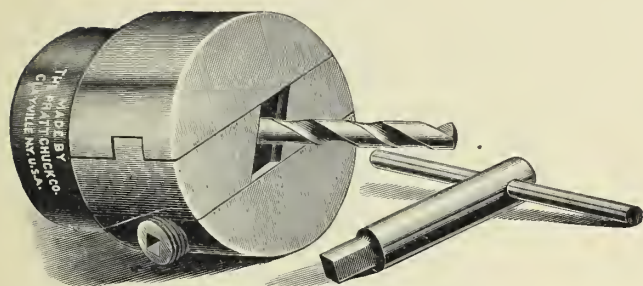
List Nos.	Diameter.	Holding Drills.	Price Each.
1	$2\frac{1}{4}$ inches	0 to $\frac{1}{2}$ inch	\$8.00
2	3 inches	0 to $\frac{3}{4}$ inch	9.00
3	$3\frac{3}{4}$ inches	0 to 1 inch	10.00
4	5 inches	0 to $1\frac{1}{2}$ inch	18.00
5	6 inches	0 to 2 inch	20.00

FIG. 749.



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FIG. 750.



THE EMPIRE FRICTION CHUCKS.

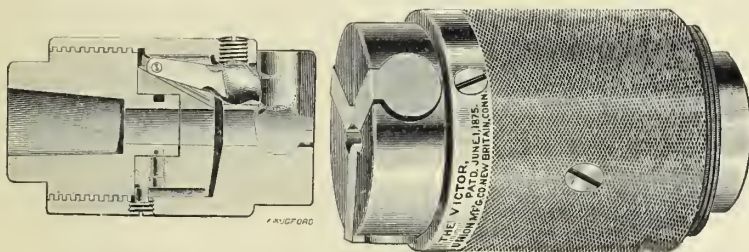
List Nos.	Diameter.	Capacity.	Price Each.
6	1¼ inches	0 to ¼ inch	\$5.00
7	2¼ inches	0 to ½ inch	6.00
8	3 inches	0 to ¾ inch	7.00
9	3¾ inches	0 to 1 inch	8.00
10	5¼ inches	0 to 1½ inches	17.00
11	6 inches	0 to 2 inches	19.00

SCREWS AND JAWS.

FOR POSITIVE DRIVING AND EMPIRE CHUCKS.

Numbers.	Screws.	Jaws, Per Set.
1	\$1.00	\$2.00
2	1.00	2.00
3	1.50	3.00
4	2.50	4.25
5	3.00	5.00
6	1.00	2.00
7	1.00	2.00
8	1.00	2.00
9	1.50	3.00
10	2.50	4.25
11	3.00	5.00

FIG. 751.

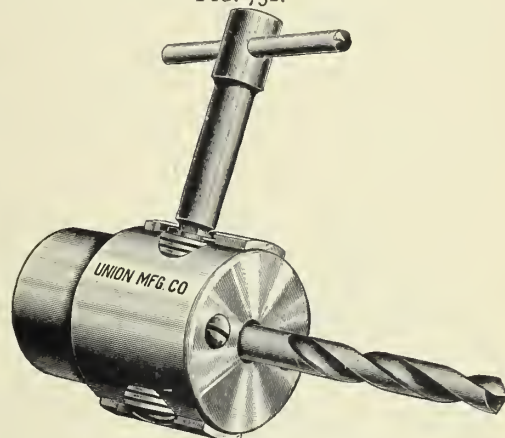


THE "VICTOR" DRILL CHUCKS.

No. 1 holds from 0 to ⅜ inch,	\$8.50
No. 2 " " 0 to ½ inch,	12.50

The above cuts represent the Victor Drill Chuck. It is an adjustable drill chuck, and is simple, practical and effective. The Chuck is self tightening, and the grasping power of the clutches is much greater than in other chucks. The clutches being flush with face or front of the Chuck, the workman has less difficulty in adjusting the drills, and greater durability is assured, as they are not liable to be broken by any strain or twist, or by dropping the Chuck. The levers are enlarged and rounded at their fulcrums, forming spherical bearings which rest against adjustable set-screws, producing a sure and easy adjustment at the will of the operator. The Chuck is steel throughout and of the finest mechanism.

FIG. 752.



THE UNION DRILL CHUCK.

The Union Drill Chuck as shown is intended for an all around chuck, capable of heavy as well as light work. It is the strongest Drill Chuck on the market, being made of the best material and in the best possible manner.

Number.	Diameter.	Holding.	Price.
000	1¼ inches	0 to ¼ inch	\$7.00
100	2¼ inches	0 to ½ inch	8.00
101	2¾ inches	0 to ¾ inch	9.00
102	3½ inches	0 to 1 inch	10.00

PRENTISS TOOL & SUPPLY CO.

FIG. 753.

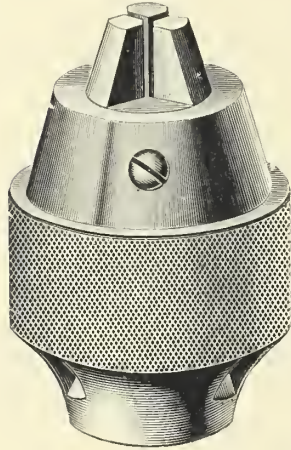
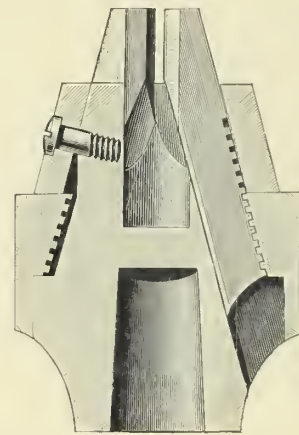


FIG. 754



“NEW MODEL” DRILL CHUCK.

THIS CHUCK is especially adapted for all light and rapid drilling, such as is done on sensitive drills and hand lathes, and where accuracy is required. The chuck is made entirely of steel, and of such grades as is best adapted to the different parts, all of which are carefully constructed. Fig. 753 represents the form of the chuck with all the parts complete, and Fig. 754 the construction and arrangement of parts.

By revolving the knurled nut the jaws are moved outward or inward in the converging slots in the chuck body as may be desired. The chuck can be operated by hand, and when a very firm grip is desired it may be obtained by the use of a spanner wrench, one being furnished with each chuck. The chuck may be taken apart readily for cleaning and oiling by removing the nut enough to disengage the jaws. In putting the chuck together it is necessary to notice that the number on the jaws corresponds with the number of the slot in the chuck body. Each chuck is ground true after the jaws are hardened. A hole the full capacity of the chuck may be drilled through the center without injury to the chuck.

Number 11,	Capacity, 0 to $\frac{7}{16}$ inch	Price, each, \$5.50
Number 12,	Capacity, 0 to $\frac{1}{2}$ inch	Price, each, 5.50
Number 13,	Capacity, 0 to $\frac{9}{16}$ inch	Price, each, 9.00

FIG. 755.

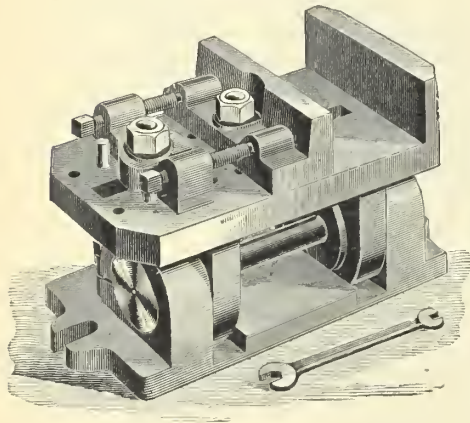


FIG. 756.

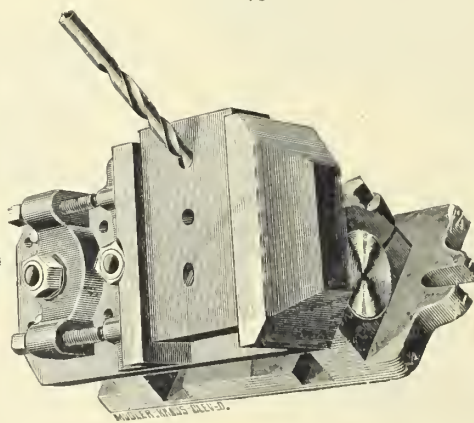
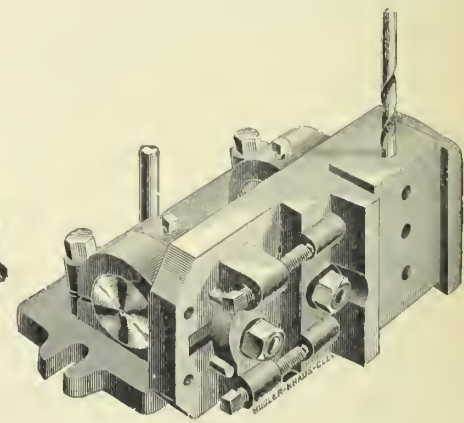


FIG. 757.



THE HANDY DRILL PRESS CHUCK, OR MILLING MACHINE VISE.

There is no blocking required for holding work in any position or angle. The views show vise in three different positions. It can be bolted to any ordinary drill press or milling machine table, and the work held perfectly secure.

The two clamping screws, as shown on pivot (Fig. 757), will hold it rigid at any desired point.

Opening of jaw, - 6 inches

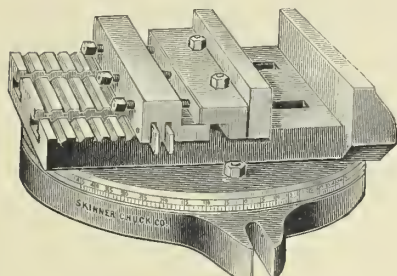
Length of jaw, - 6 inches

Depth of jaw, - 2 inches

Weight, - 60 pound

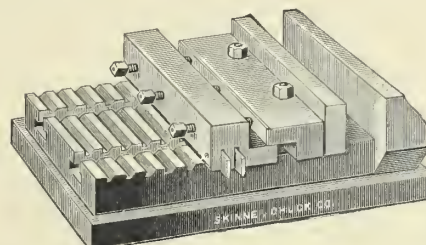
PRENTISS TOOL & SUPPLY CO.

FIG. 758.



ROUND SWIVEL BASE.

FIG. 759.



SQUARE BASE.

IMPROVED PLANER CHUCKS.

ADAPTED FOR USE ON PLANERS, SHAPERS, MILLING MACHINES AND UPRIGHT DRILLS.

THESE chucks are heavy and strong, are accurately made of the best materials, and have a great capacity. Set screws and holding strips are made of crucible steel, and the ends of set screws are hardened. All nuts are thoroughly case-hardened. A strip of tool steel is fitted to the moveable jaw to take the thrust of the set screws. A drop forged steel wrench is furnished with each chuck.

These chucks will hold either straight or taper work, and can be instantly adjusted from 0 to greatest capacity, no blocking or packing being necessary. The moveable jaw will not tip back or raise work from the bed.

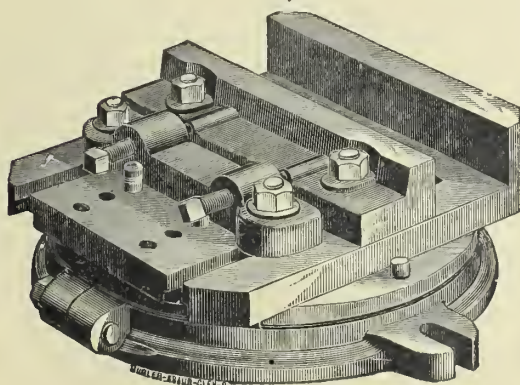
A rib $1\frac{1}{8}$ inches wide is cast on the bottom of all round base chucks for fitting to slots in planer table. We can arrange the base of these chucks to attach to a variety of styles and makes of machines as desired. All round base chucks are accurately graduated.

DIMENSIONS OF SKINNER IMPROVED PLANER CHUCKS.

ROUND SWIVEL BASE CHUCK.						SQUARE BASE CHUCK.		
Size Chuck No.	Price.	Length of Jaw.	Depth of Jaw.	Jaws will Open.	Space Required.	Size Chuck No.	Price.	Space Required.
6	\$25.00	7 inches	$1\frac{1}{2}$ inches	$3\frac{1}{2}$ inches	10 inches	6	\$20.00	$7\frac{1}{4}$ x 11 inches
8	30.00	9 inches	$1\frac{7}{8}$ inches	5 inches	$12\frac{1}{2}$ inches	8	25.00	9 x $12\frac{1}{2}$ inches
10	36.00	11 inches	$2\frac{3}{8}$ inches	6 inches	$14\frac{1}{2}$ inches	10	30.00	11 x 15 inches
12	40.00	13 inches	$2\frac{3}{8}$ inches	8 inches	$16\frac{3}{4}$ inches	12	35.00	13 x 17 inches
15	50.00	$15\frac{1}{2}$ inches	$2\frac{1}{2}$ inches	$9\frac{1}{2}$ inches	20 inches	15	45.00	$15\frac{1}{2}$ x 21 inches
18	60.00	$18\frac{1}{2}$ inches	$2\frac{3}{4}$ inches	$11\frac{1}{4}$ inches	23 inches	18	55.00	$18\frac{1}{2}$ x 24 inches
24	90.00	$24\frac{1}{4}$ inches	$2\frac{3}{4}$ inches	16 inches	27 inches	24	75.00	$24\frac{1}{4}$ x 28 inches
30	120.00	$30\frac{1}{4}$ inches	$2\frac{3}{4}$ inches	$21\frac{1}{2}$ inches	34 inches	30	100.00	$30\frac{1}{4}$ x 34 inches

FIG. 760.

SWIVEL PLANER CHUCK.



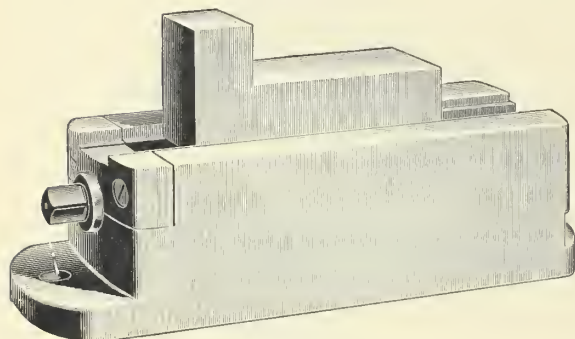
This Planer Chuck has a round swivel base and can be set at any desired angle. The round pin, as shown in position on side of upper piece, is tapered and fitting into a taper hole, holds the chuck parallel with the base. By withdrawing the pin and turning the chuck one quarter, the pin again drops into position perfectly square with the base. An entirely new feature is the moveable cross piece, with two setting up screws and the two pins shown in position, to prevent same from slipping. It requires no blocking to follow up the work, will hold irregular work nicely, and is very easily adjusted.

SPECIFICATIONS.

Diameter.	Opening of Jaw.	Length of Jaw.	Depth of Jaw.	Weight.
17 inches	9 inches	14 inches	$2\frac{1}{2}$ inches	200 pounds
12 inches	6 inches	10 inches	$2\frac{1}{2}$ inches	125 pounds

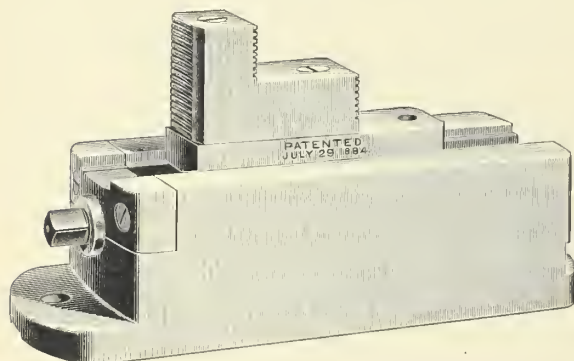
PRENTISS TOOL & SUPPLY CO.

FIG. 782.



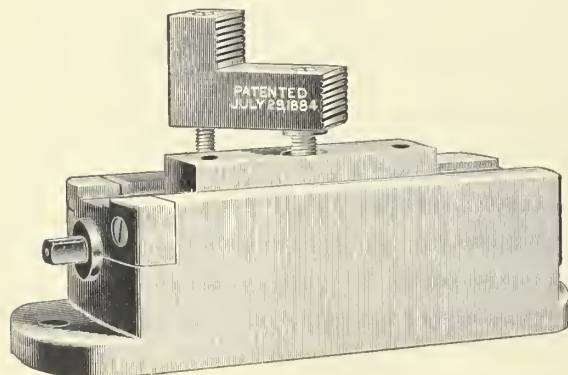
FACE PLATE JAW, SHOWING SOLID JAW NO. 28.

FIG. 783.



FACE PLATE JAW, SHOWING REVERSIBLE JAW NO. 30.

FIG. 784.



FACE PLATE JAW, WITH REVERSIBLE JAW NO. 30, SHOWING METHOD OF REVERSING JAW.

NEW FACE PLATE JAWS.

NOS. 28 AND 30.

The general success which the patent reversible jaw has met in the market during the past few years, has led the manufacturer to adopt same for this new face plate jaw, thus putting it on an equal footing with this well known line of lathe chucks. As shown in cut, the jaw can be reversed by simply loosening the screws and revolving the top; reversing the jaw in half the time required by any other reversible jaw.

When desired, we also furnish with solid jaw, as shown in Fig. 782.

We furnish them in three sizes, as per list below. They are made strong and compactly, and they are guaranteed against any chuck made.

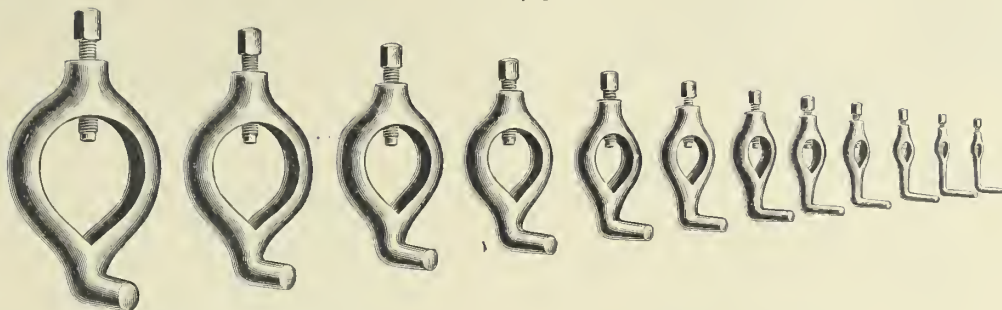
We furnish two bolts with each jaw, and a steel key with each set.

Size.	Price Per Set of Three, with either Solid or Reversible Jaws.	Price Per Set of Four, with either Solid or Reversible Jaws.
8 inches	\$45.00	\$60.00
10 inches	60.00	80.00
12 inches	90.00	120.00

DROP FORGED LATHE DOGS.

COMMON DOGS.

FIG. 785.



$\frac{3}{8}$ inch,	-	-	-	-	\$.50	$1\frac{1}{4}$ inch,	-	-	-	-	\$.95	$2\frac{1}{2}$ inch,	-	-	-	-	\$1.60
$\frac{1}{2}$ inch,	-	-	-	-	.60	$1\frac{1}{2}$ inch,	-	-	-	-	1.10	3 inch,	-	-	-	-	1.80
$\frac{3}{4}$ inch,	-	-	-	-	.70	$1\frac{3}{4}$ inch,	-	-	-	-	1.25	$3\frac{1}{2}$ inch,	-	-	-	-	2.00
1 inch,	-	-	-	-	.80	2 inch,	-	-	-	-	1.40	4 inch,	-	-	-	-	2.30

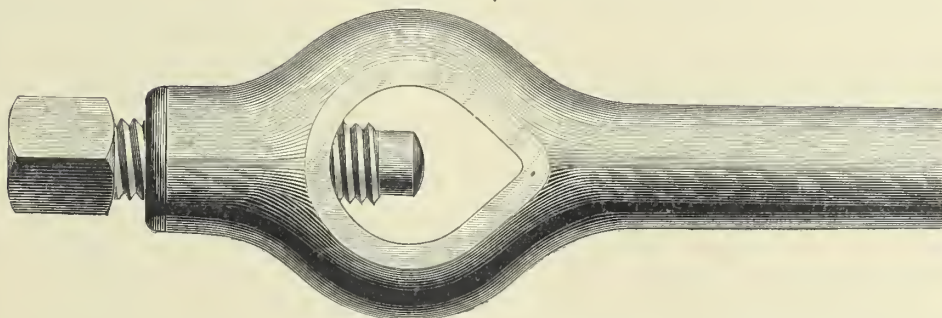
DOG SCREWS.

For $\frac{3}{8}$ inch dog,	-	-	-	8 cents each	For $1\frac{1}{4}$ inch dog,	-	-	-	15 cents each	For $2\frac{1}{2}$ inch dog,	-	-	-	25 cents each
For $\frac{1}{2}$ inch dog,	-	-	-	10 cents each	For $1\frac{1}{2}$ inch dog,	-	-	-	18 cents each	For 3 inch dog,	-	-	-	30 cents each
For $\frac{3}{4}$ inch dog,	-	-	-	12 cents each	For $1\frac{3}{4}$ inch dog,	-	-	-	20 cents each	For $3\frac{1}{2}$ inch dog,	-	-	-	32 cents each
For 1 inch dog,	-	-	-	15 cents each	For 2 inch dog,	-	-	-	22 cents each	For 4 inch dog,	-	-	-	35 cents each

CHUCKING REAMER HOLDER.

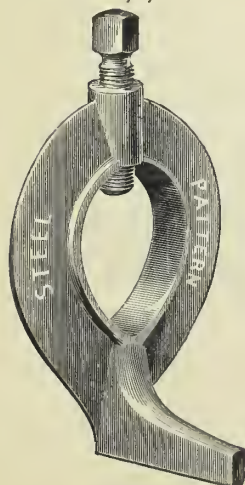
DROP FORGED FROM BAR STEEL.

FIG. 786.



	Size of Hole.	Size of Handle.	Length of Handle from Center of Hole.	Price.
No. 1,	$\frac{9}{16}$ inch	$\frac{1}{2}$ inch	10 inches	\$.85
No. 2,	$\frac{13}{16}$ inch	$\frac{5}{8}$ inch	12 inches	1.00
No. 3,	$1\frac{1}{16}$ inch	$\frac{13}{16}$ inch	$13\frac{1}{4}$ inches	1.25
No. 4,	$1\frac{7}{16}$ inch	$1\frac{1}{8}$ inch	15 inches	1.50

FIG. 787.



LIGHT STEEL DOG.

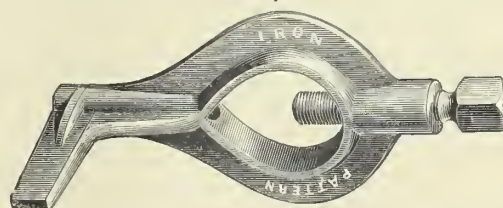
With Steel Screws. U. S. Standard.
Points Hardened.

No.		Price.
1	$\frac{3}{8}$ inch	\$.35
2	$\frac{1}{2}$ inch	.35
3	$\frac{3}{4}$ inch	.50
4	1 inch	.60
5	$1\frac{1}{4}$ inch	.75
6	$1\frac{1}{2}$ inch	.85
7	$1\frac{3}{4}$ inch	1.00
8	2 inch	1.10
Small set of 8, \$5.50		
9	$2\frac{1}{2}$ inch	1.40
10	3 inch	1.50
11	$3\frac{1}{2}$ inch	1.70
12	4 inch	1.90

Full Set of 12, \$12.00

PATENT MALLEABLE IRON LATHE DOG.

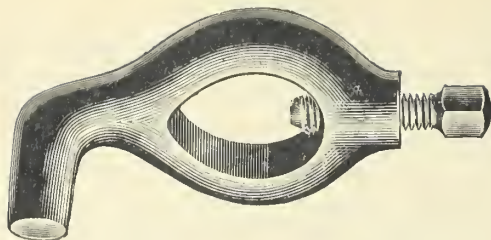
With Steel Screws. U. S. Standard. Points Hardened.
FIG. 788.



No.	Price.	No.	Price.
1	$\frac{3}{8}$ inch \$.30	7	$1\frac{3}{4}$ inch \$.90
2	$\frac{1}{2}$ inch .30	8	2 inch 1.00
3	$\frac{3}{4}$ inch .40	9	$2\frac{1}{2}$ inch 1.20
4	1 inch .40	10	3 inch 1.30
5	$1\frac{1}{4}$ inch .60	11	$3\frac{1}{2}$ inch 1.40
6	$1\frac{1}{2}$ inch .60	12	4 inch 1.60

Small set of 8, \$4.50. Full set of 12, \$10.00.

FIG. 789.

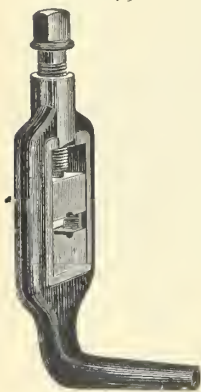
**HEAVY STEEL DOG.**

With steel screws. U. S. standard and the points hardened.
This Dog has a very heavy boss, so that if the thread wears,
a heavier screw can be substituted.

No.	Inches.	Price.	No.	Inches.	Price.
1	$\frac{3}{8}$	\$.40	13	$2\frac{1}{4}$	\$1.35
2	$\frac{1}{2}$	.50	14	$2\frac{1}{2}$	1.45
3	$\frac{5}{8}$	.60	15	3	1.60
4	$\frac{3}{4}$	.60	16	$3\frac{1}{2}$	1.80
5	$\frac{7}{8}$	.70	17	4	2.10
6	1	.70	18	$4\frac{1}{2}$	2.75
7	$1\frac{1}{8}$	.80	19	5	3.25
8	$1\frac{1}{4}$	.80	Full set of 19,		23.60
9	$1\frac{3}{8}$	.95	20 (extra)	$5\frac{1}{2}$	4.00
10	$1\frac{1}{2}$	.95	21 (extra)	6	5.00
11	$1\frac{3}{4}$	1.10	22 (extra)	7	6.00
12	2	1.20	23 (extra)	8	7.00
One small set of No. 8, by $\frac{1}{4}$ to 2 inches,					6.25
One set of No. 12, by $\frac{1}{4}$ to 2 inches, continued by $\frac{1}{2}$ to 4 inches					13.20

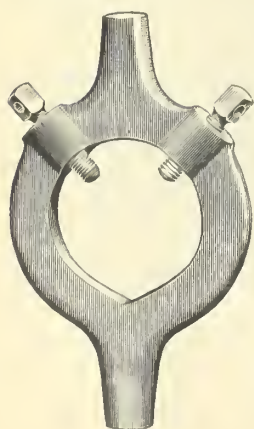
When ordering, state as above, whether a full set, or a set of 12, or small set of 8 is wanted.

FIG. 790.

**DIE DOG.**

No. 1.	$1\frac{1}{4}$ inches between sides,	\$3.00
	Extra dies, per pair,	.50
No. 2.	2 inches between sides,	4.00
	Extra dies, per pair,	.75
	Screws,	.10

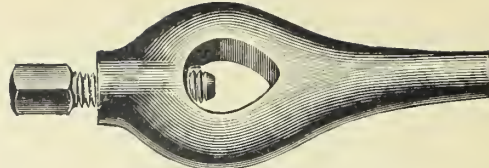
FIG. 791.

**"DOUBLE TAIL" LATHE DOG.**

The body is extra strong, and two large screws are used—thus securing a double hold on the work—while being driven from two points the twisting strain of the bent tail dog is avoided and its efficiency increased accordingly.

6 inches,	-	-	-	\$12.00
7 inches,	-	-	-	13.50
8 inches,	-	-	-	14.50
9 inches,	-	-	-	17.00
10 inches,	-	-	-	19.50
11 inches,	-	-	-	26.00
12 inches,	-	-	-	28.00

FIG. 792.

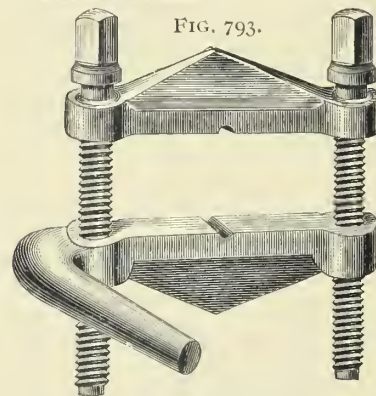
**STRAIGHT TAIL DOG.**

WITH STEEL SCREWS.

No.	Inches.	Price.	No.	Inches.	Price.
1	$\frac{3}{4}$	\$.60	11	$2\frac{1}{2}$	\$1.45
2	$\frac{7}{8}$	.70	12	3	1.60
3	1	.70	13	$3\frac{1}{2}$	1.80
4	$1\frac{1}{8}$	.80	14	4	2.10
5	$1\frac{1}{4}$	.80	15	$4\frac{1}{2}$	2.75
6	$1\frac{3}{8}$	.95	16	5	3.25
7	$1\frac{1}{2}$	.95	17	$5\frac{1}{2}$	4.00
8	$1\frac{3}{4}$	1.10	18	6	5.00
9	2	1.20	19	7	6.00
10	$2\frac{1}{4}$	1.35	20	8	7.00

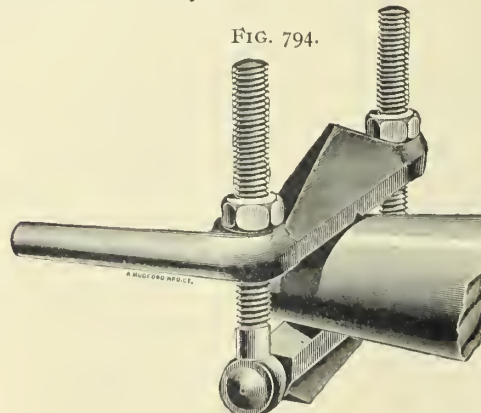
One set to 2 inches, \$7.80. Full set, \$44.10.

FIG. 793.

**CLAMP DOG.**

No. 1.	$1\frac{3}{4}$ inches between screws,	-	-	-	\$1.50
No. 2.	$2\frac{1}{4}$ inches between screws,	-	-	-	2.00
No. 3.	$2\frac{3}{4}$ inches between screws,	-	-	-	2.50
Per set of three,					5.50
No. 1.	Screw, each,	-	-	-	.10
No. 2.	Screw, each,	-	-	-	.15
No. 3.	Screw, each,	-	-	-	.20
No. 1.	Screw for swivel jaw, each,	-	-	-	.12
No. 2.	Screw for swivel jaw, each,	-	-	-	.18
No. 3.	Screw for swivel jaw, each,	-	-	-	.25

FIG. 794.

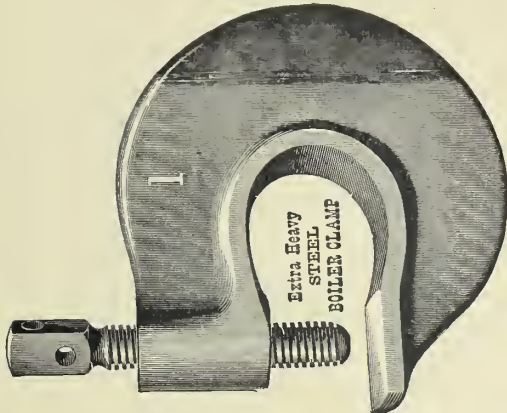
**CLAMP DOG.**

CLAMP DOG, WITH SWIVEL JAW.

No. 1.	$1\frac{3}{4}$ inches between screws,	-	-	-	\$1.75
No. 2.	$2\frac{1}{4}$ inches between screws,	-	-	-	2.25
No. 3.	$2\frac{3}{4}$ inches between screws,	-	-	-	2.75

PRENTISS TOOL & SUPPLY CO.

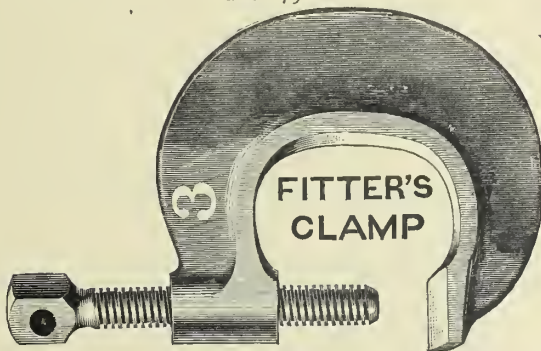
FIG. 795.



EXTRA HEAVY STEEL BOILER CLAMP.

No. 1, 2 inches, -	\$3.00	No. 5, 6 inches, -	\$7.50
No. 2, 3 inches, -	4.00	No. 6, 8 inches, -	8.50
No. 3, 4 inches, -	5.00	No. 7, 10 inches, -	10.00
No. 4, 5 inches, -	6.00		

FIG. 796.



FITTER'S CLAMP.

MADE OF STEEL. VERY STRONG.

Has a square thread steel screw with hardened point running down to the foot. The foot is planed square by the screw.

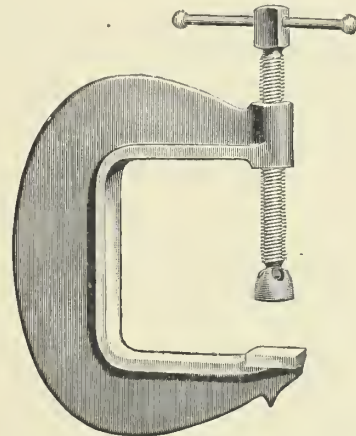
No. 1, opens 1 1/4 inches, runs back 1 1/4 inches, -	\$1.25
No. 2, opens 1 3/4 inches, runs back 1 3/4 inches, -	1.50
No. 3, opens 2 1/2 inches, runs back 2 1/2 inches, -	1.75

HEAVY STEEL CLAMP.

The back is 2 1/2 inches from center of screw.

No. 1, opening to 2 inches, -	\$1.75
No. 2, opening to 3 inches, -	2.00
No. 3, opening to 4 inches, -	2.25
No. 4, opening to 5 inches, -	2.50
No. 5, opening to 6 inches, -	2.75
No. 6, opening to 8 inches, -	3.25
No. 7, opening to 10 inches, -	3.75
No. 8, opening to 12 inches, -	4.25
No. 9, opening to 14 inches, -	5.00
No. 10, opening to 16 inches, -	6.00
No. 11, opening to 18 inches, -	7.00
Full set, 11 sizes, -	\$40.50

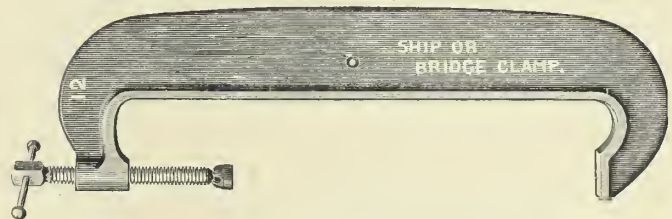
FIG. 797.



6 1-2 INCH CLAMP.

6 inches, -	\$12.00
10 inches, -	16.00

FIG. 798.



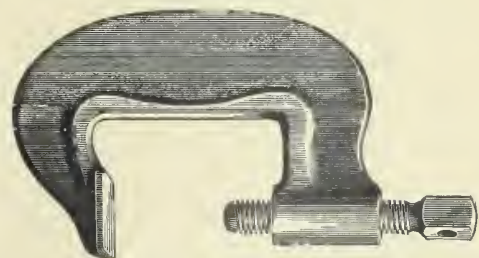
EXTRA HEAVY STEEL BRIDGE CLAMP.

THE SCREW IS HEAVY AND HAS BUTTON ON THE END.

No. 12 opens 24 inches, -	\$12.00
No. 13 opens 30 inches, -	16.00

The screws of all the clamps are made to reach the lower number.

FIG. 799.

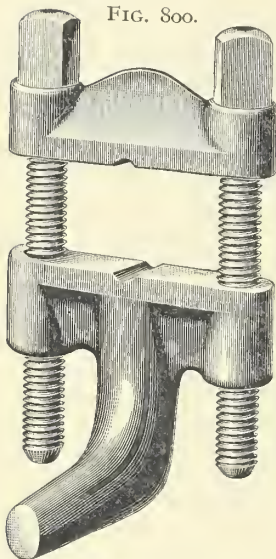


MECHANIC'S CLAMP.

The back is 1 1/2 inches from center of screw.

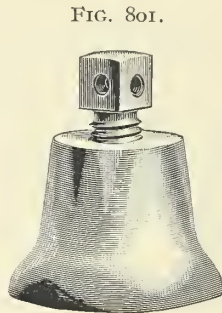
No. 1, opens 2 inches, \$1.25	No. 5, opens 6 inches, \$2.25
No. 2, opens 3 inches, 1.50	No. 6, opens 7 inches, 2.50
No. 3, opens 4 inches, 1.75	No. 7, opens 8 inches, 2.75
No. 4, opens 5 inches, 2.00	No. 8, opens 9 inches, 3.00
Full set, -	\$17.00

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PATENT CLAMP DOG.

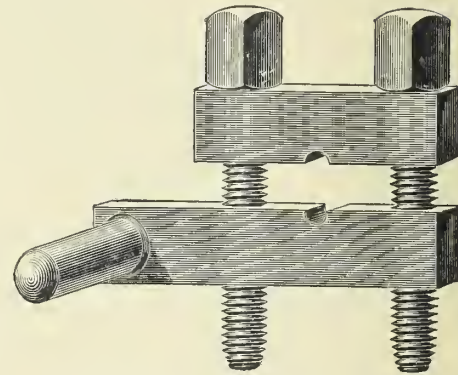
No. 1 opens 1 inch, - - - -	\$1.00
No. 2 opens 1½ inch, - - - -	1.10
No. 3 opens 2 inches, - - - -	1.30
No. 4 opens 3 inches, - - - -	1.60
Sets of four, - - - -	5.00



CAST IRON JACK SCREWS.

For use as blocking on planer, drill press, milling machine, boring mills, &c. This useful little tool is strong, well made and of great convenience in a machine shop.

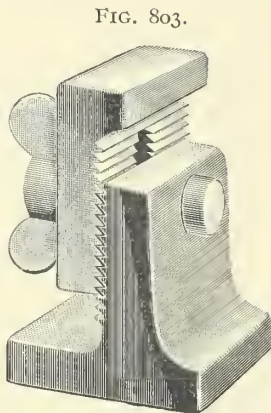
No. 1, size 1½ to 1½ inch, - - -	\$.45
No. 2, size 1½ to 2 inches, - - -	.50
No. 3, size 2 to 2¾ inches, - - -	.60
No. 4, size 2¾ to 3¼ inches, - - -	.75
No. 5, size 3¼ to 5¼ inches, - - -	.95
No. 6, size 5¼ to 7¼ inches, - - -	1.50
Full set, - - - -	4.75



STEEL CLAMP DOG.

These are made from the steel bar.

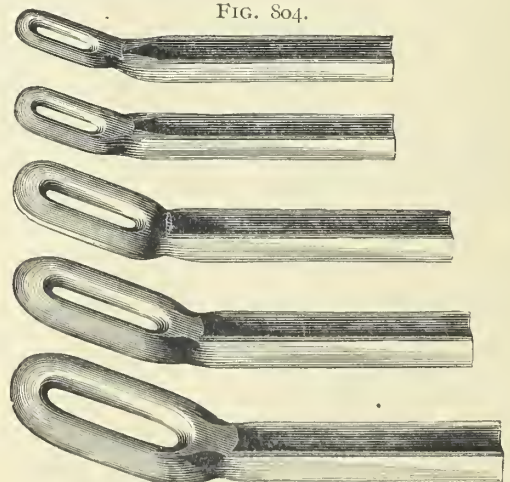
No. 1, opens 1 inch, - - - -	\$1.25
No. 2, opens 1½ inch, - - - -	1.50
No. 3, opens 2 inches, - - - -	1.75
No. 4, opens 3 inches, - - - -	2.00
Full set, - - - -	6.50



IMPROVED ADJUSTABLE BLOCKING.

An improved device for use as blocking where work is to be strapped to the machine. It is quickly adjusted to any point within its range. Is strong, firm and well made, and is a great improvement over other devices for this purpose.

No. 1, size 3 to 4 inches, - - - -	\$2.00
No. 2, size 4 to 5¾ inches, - - - -	2.20
No. 3, size 5¾ to 7¾ inches, - - - -	2.60
No. 4, size 7¾ to 11 inches, - - - -	3.50
Full set, - - - -	10.30



STEEL CHUCK DRILL HOLDERS.

They are of five sizes. The slot is rounded every way so as to avoid corners that interfere with centering the drill. If a plate is put under the screw in the screw in the tool post to prevent bending, they will do good service.

No. 1, taking drills from ¾ to 1⅞ inch, - - - -	\$.50
No. 2, taking drills from ¾ to ¾ inch, - - - -	.50
No. 3, taking drills from ¾ to 1½ inch, - - - -	.60
No. 4, taking drills from 1½ to 1⅝ inch, - - - -	.75
No. 5, taking drills from 1⅝ to 2 inches, - - - -	.90
Full set, - - - -	3.25

FIG. 805.



STRAIGHT LIP INCREASE TWIST DRILLS.

WITH MORSE TAPER OR STRAIGHT SHANKS, TAPER LENGTH.

Diameter.	Length.	Price Each.
1/4 inch	6 1/4 inches	\$.60
17 64 inch	6 1/4 inches	.65
9-32 inch	6 1/4 inches	.65
19-64 inch	6 3/4 inches	.70
5-16 inch	6 3/4 inches	.70
21-64 inch	6 3/4 inches	.75
11-32 inch	6 1/2 inches	.75
23-64 inch	6 3/4 inches	.80
3/8 inch	6 3/4 inches	.80
25-64 inch	7 inches	.85
13-32 inch	7 inches	.85
27-64 inch	7 1/4 inches	.90
7-16 inch	7 1/4 inches	.90
29 64 inch	7 1/2 inches	.95
15-32 inch	7 1/2 inches	.95
31-64 inch	7 3/4 inches	1.00
1/2 inch	7 3/4 inches	1.00
33 64 inch	8 inches	1.10
17-32 inch	8 inches	1.10
35-64 inch	8 1/4 inches	1.20
9-16 inch	8 1/4 inches	1.20
37-64 inch	8 1/2 inches	1.30
19-32 inch	8 1/2 inches	1.30

No. 1. Socket for Standard or Morse taper. Price, \$1.20.

Diameter	Length.	Price Each.
39 64 inch	8 3/4 inches	\$1.40
5/8 inch	8 3/4 inches	1.40
41-64 inch	9 inches	1.50
21-32 inch	9 inches	1.50
43-64 inch	9 1/4 inches	1.60
11-16 inch	9 1/4 inches	1.60
45 64 inch	9 1/2 inches	1.70
23-32 inch	9 1/2 inches	1.70
47 64 inch	9 3/4 inches	1.85
3/4 inch	9 3/4 inches	1.85
49 64 inch	9 7/8 inches	2.00
25-32 inch	9 7/8 inches	2.00
51-64 inch	10 inches	2.15
13-16 inch	10 inches	2.15
53-64 inch	10 1/4 inches	2.30
27-32 inch	10 1/4 inches	2.30
55-64 inch	10 1/2 inches	2.45
7/8 inch	10 1/2 inches	2.45
57-64 inch	10 3/8 inches	2.60
29-32 inch	10 3/8 inches	2.60

No. 2. Socket for Standard or Morse taper. Price, \$1.80.

Diameter.	Length.	Price Each.
59-64 inch	10 3/4 inches	\$2.75
15-16 inch	10 3/4 inches	2.75
61-64 inch	10 7/8 inches	2.90
31-32 inch	10 7/8 inches	2.90
63-64 inch	11 inches	3.00
1 inch	11 inches	3.00
1 1-64 inches	11 1/8 inches	3.20
1 1-32 inches	11 1/8 inches	3.20
1 3-64 inches	11 1/4 inches	3.40
1 1-16 inches	11 1/4 inches	3.40
1 5-64 inches	11 1/2 inches	3.60
1 3-32 inches	11 1/2 inches	3.60
1 7-64 inches	11 3/4 inches	3.80
1 1/8 inches	11 3/4 inches	3.80
1 9-64 inches	11 7/8 inches	4.00
1 5-32 inches	11 7/8 inches	4.00
1 11-64 inches	12 inches	4.20
1 3-16 inches	12 inches	4.20
1 13-64 inches	12 1/8 inches	4.40
1 7-32 inches	12 1/8 inches	4.40
1 15-64 inches	12 1/2 inches	4.50
1 1/4 inches	12 1/2 inches	4.50

No. 3. Socket for Standard or Morse taper. Price, \$2.50.

"Standard and Morse taper, the same.

Diameter.	Length.	Price Each.
1 17-64 inches	14 1/8 inches	\$4.65
1 9-32 inches	14 1/8 inches	4.65
1 19-64 inches	14 1/4 inches	4.80
1 5-16 inches	14 1/4 inches	4.80
1 21-64 inches	14 3/8 inches	5.00
1 11-32 inches	14 3/8 inches	5.00
1 23-64 inches	14 1/2 inches	5.20
1 3/8 inches	14 1/2 inches	5.20
1 25-64 inches	14 3/4 inches	5.40
1 13-32 inches	14 3/4 inches	5.40
1 27-64 inches	14 3/4 inches	5.60
1 7-16 inches	14 3/4 inches	5.60
1 29-64 inches	14 7/8 inches	5.80
1 15-32 inches	14 7/8 inches	5.80
1 31-64 inches	15 inches	6.00
1 1/2 inches	15 inches	6.00

No. 4. Socket for Standard or Morse taper. Price, \$4.00.

"Standard" or Morse taper, the same.

Diameter.	Length.	Price Each.
1 17-32 inches	15 1/8 inches	\$6.30
1 9-16 inches	15 1/4 inches	6.60
1 19-32 inches	15 3/8 inches	6.90
1 3/8 inches	15 1/2 inches	7.20
1 21-32 inches	15 3/4 inches	7.50
1 11-16 inches	15 3/4 inches	7.80
1 23-32 inches	15 7/8 inches	8.10
1 1 1/4 inches	16 inches	8.40
1 25-32 inches	16 1/8 inches	8.60
1 13-16 inches	16 1/4 inches	8.80
1 27-32 inches	16 3/8 inches	9.00
1 7/8 inches	16 1/2 inches	9.20
1 29-32 inches	16 1/2 inches	9.35
1 15-16 inches	16 1/2 inches	9.50
1 31-32 inches	16 3/4 inches	9.65
2 inches	16 3/4 inches	9.80

No. 4. Socket for Morse taper. Price, \$4.00.

Diameter.	Length.	Price Each.
2 1-32 inches	16 1/2 inches	\$10.20
2 1-16 inches	17 inches	10.60
2 1/8 inches	17 inches	11.20
2 3-16 inches	17 inches	12.00
2 1/4 inches	17 1/2 inches	12.80
2 5-16 inches	17 1/2 inches	13.60
2 3/8 inches	18 inches	14.40
2 7-16 inches	18 1/2 inches	15.00
2 1/2 inches	19 inches	15.60
2 9-16 inches	19 1/4 inches	16.20
2 5/8 inches	19 1/2 inches	16.80
2 11-16 inches	20 inches	17.60
2 3/4 inches	20 1/2 inches	19.00
2 13-16 inches	20 3/4 inches	20.00
2 7/8 inches	21 inches	21.00
2 15-16 inches	21 inches	23.00
3 inches	22 inches	25.00

No. 5. Socket for Morse taper. Price, \$7.50.

STRAIGHT LIP INCREASE TWIST DRILLS.

WITH MORSE TAPER SHANKS, STRAIGHT SHANKS AND SQUARE SHANKS.

No.	Description	Per Set.
No. 1.	Set of taper shank drills, 1/4 to 1 inch, varying by 16ths,	\$20.00
No. 2.	Set of taper shank drills, 3/8 to 1 1/4 inches, varying by 16ths,	34.50
No. 3.	Set of taper shank drills, 3/8 to 3/4 inch, by 32ds, 3/4 to 1 1/4 inches, by 16ths,	42.00
No. 4.	Set of taper shank drills, 3/8 to 3/4 inch, by 32ds, 1 1/8 to 1 1/2 inches, by 16ths,	\$64.00 } 67.00 }
	1 5/8 to 2 inches, by 16ths,	
No. 5.	Set drills, straight shanks, 1/16 to 1/2 inch, by 64ths, mounted,	10.00
No. 6.	Set drills, straight shanks, 1/16 to 1/2 inch, by 32ds, mounted,	5.40
No. 7.	Set drills, from 60 to 3/8 inch, mounted,	9.90
No. 8.	Set drills, steel wire gauge, from No. 1 to 60, mounted,	8.10
No. 9.	Half set drills, alternate Nos. from 1 to 59, mounted,	4.30
No. 10.	Jewelers set of 36 drills, No. 30 (1/8 inch) to No. 65, steel wire gauge, mounted, in a Mahogany case with cap,	4.25
No. 11.	Set of taper shank drills, 3/8 to 1 1/2 inches, by 32ds,	105.00
No. 12.	Set machine bits, 1/8 to 1/2 inch, mounted, varying by 32ds,	7.00
No. 13.	Set bit stock drills, 1/8 to 1/4 inch, by 32ds, 1/4 to 3/8 inch, by 16ths, boxed,	2.60

STRAIGHT SHANK DRILLS.

FIG. 806.



No. 105.

JOBBER'S AND MACHINISTS' SETS.

Diameter.	Length.	Price per Dozen.	Price Each.
1-16 inch	2½ inches	\$1.00	9 cents
5-64 inch	2¾ inches	1.10	10 cents
3-32 inch	2¾ inches	1.20	11 cents
7-64 inch	2¾ inches	1.30	12 cents
½ inch	3 inches	1.45	13 cents
9-64 inch	3½ inches	1.60	15 cents
5-32 inch	3¼ inches	1.80	16 cents
11-64 inch	3¾ inches	2.00	18 cents
3-16 inch	3½ inches	2.20	20 cents
13-64 inch	3¾ inches	2.40	21 cents
7-32 inch	3¾ inches	2.65	23 cents
15-64 inch	3¾ inches	2.90	26 cents
¼ inch	4 inches	3.15	28 cents
17-64 inch	4½ inches	3.40	30 cents
9-32 inch	4¼ inches	3.65	32 cents
19-64 inch	4¾ inches	3.90	35 cents
5-16 inch	4½ inches	4.20	37 cents
21-64 inch	4¾ inches	4.50	40 cents
11-32 inch	4¾ inches	4.80	42 cents
23-64 inch	4¾ inches	5.10	45 cents
⅜ inch	5 inches	5.40	48 cents
25-64 inch	5½ inches	5.70	50 cents
13-32 inch	5¼ inches	6.00	53 cents
27-64 inch	5¾ inches	6.40	55 cents
7-16 inch	5½ inches	6.80	59 cents
29-64 inch	5¾ inches	7.20	63 cents
15-32 inch	5¾ inches	7.50	65 cents
31-64 inch	5¾ inches	7.75	67 cents
½ inch	6 inches	8.00	70 cents

No. 106.

LETTER SIZES.

Diameter.	Decimals.	Length.	Price per Dozen.	Price Each.
A	.234 inch	3 13-16 inches	\$2.90	26 cents
B	.238 inch	3 13-16 inches	3.00	27 cents
C	.242 inch	3 13-16 inches	3.10	28 cents
D	.246 inch	3 13-16 inches	3.20	29 cents
E	.250 inch	3 13-16 inches	3.30	30 cents
F	.257 inch	4¼ inches	3.40	30 cents
G	.261 inch	4¼ inches	3.50	31 cents
H	.266 inch	4¼ inches	3.60	32 cents
I	.272 inch	4¼ inches	3.70	33 cents
J	.277 inch	4¼ inches	3.80	34 cents
K	.281 inch	4¼ inches	3.90	35 cents
L	.290 inch	4¼ inches	4.00	36 cents
M	.295 inch	4¼ inches	4.10	36 cents
N	.302 inch	4¼ inches	4.20	37 cents
O	.316 inch	4¼ inches	4.30	38 cents
P	.323 inch	4¾ inches	4.40	39 cents
Q	.332 inch	4¾ inches	4.60	40 cents
R	.339 inch	4¾ inches	4.80	42 cents
S	.348 inch	4¾ inches	5.00	44 cents
T	.358 inch	4¾ inches	5.20	45 cents
U	.368 inch	5 inches	5.40	47 cents
V	.377 inch	5 inches	5.60	49 cents
W	.386 inch	5½ inches	5.80	51 cents
X	.397 inch	5¼ inches	6.00	53 cents
Y	.404 inch	5¼ inches	6.40	55 cents
Z	.413 inch	5¾ inches	6.80	59 cents

BIT STOCK DRILLS.

FIG. 807.

FOR METAL OR WOOD.

No. 108.



Diameter.	Price per Dozen.	Price Each.
1-16 inch	\$1.50	\$.14
3-32 inch	1.65	.16
4-32 inch	2.10	.20
5-32 inch	2.60	.24
6-32 inch	3.10	.29
7-32 inch	3.60	.33
8-32 inch	4.10	.38
9-32 inch	4.70	.43
10-32 inch	5.40	.48
11-32 inch	6.30	.54
12-32 inch	7.20	.62
13-32 inch	8.00	.68
14-32 inch	8.80	.75
15-32 inch	9.60	.82
16-32 inch	10.30	.87
17-32 inch	11.00	.92
9-36 inch	14.35	1.20
⅝ inch	16.15	1.35
11-16 inch	17.95	1.50
¾ inch	19.75	1.65
13-16 inch	21.55	1.80
⅞ inch	23.35	1.95
15-16 inch	25.75	2.15
1 inch	28.15	2.35

These bit stock drills will fit any brace in the market, and will drill steel, iron or other metals as well as wood. They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it.

Price per set, ⅝ to ⅞ by 32ds, 10 to 1½ by 16ths, boxed, - \$2.60

FIG. 808.



No. 104 A.

TAPER SQUARE SHANK DRILLS.

FITTING RATCHETS.

Diameter.	Length.	Price Each.	Diameter.	Length.	Price Each.	Diameter.	Length.	Price Each.
Inches.	Inches.		Inches.	Inches.		Inches.	Inches.	
¼	5	\$1.00	11-16	6½	\$1.45	1 1-8	9	\$3.10
9-32	5	1.05	23-32	6½	1.50	1 5-32	9	3.25
5-16	5	1.10	¾	6½	1.55	1 3-16	9	3.40
11-32	5	1.15	25-32	6½	1.65	1 7-32	9	3.55
⅜	6	1.20	13-16	7	1.75	1¼	9½	3.75
13-32	6¼	1.25	27-32	7	1.90	1 9-32	9½	3.95
7-16	6¼	1.25	⅞	7½	2.05	1 5-16	9½	4.20
15-32	6¼	1.30	29-32	7½	2.15	1 11-32	9½	4.45
½	6½	1.30	15-16	8	2.30	1¾	10	4.70
17-32	6½	1.35	31-32	8	2.45	1 13-32	10	4.95
9-16	6½	1.35	1	8½	2.55	1 7-16	10	5.25
19-32	6½	1.40	1 1-32	8½	2.70	1 15-32	10	5.50
⅝	6½	1.40	1 1-16	8½	2.85	1½	10	5.75
21-32	6½	1.45	1 3-32	8½	3.00			

Shanks ⅝ inch by ⅜ inch and 1½ inches long, and shanks ¾ by ½ inch and 1¼ inches long.

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FIG. 809.



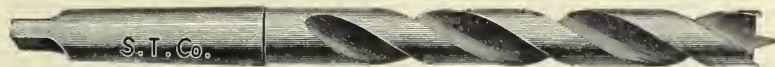
DRILLS FITTING BLACKSMITHS' DRILL PRESSES.

Diameter.	Length.	Price.	Diameter.	Length.	Price.	Diameter.	Length.	Price.
1-8 inch	4 7-8 inches	\$0.55	19-32 inch	6 inches	1.03	1 1-16 inch	6 inches	2.00
5-32 inch	5 5-8 inches	.58	5-8 inch	6 inches	1.05	1 3-32 inch	6 inches	2.10
3-16 inch	6 inches	.60	21-32 inch	6 inches	1.10	1 1-8 inch	6 inches	2.20
7-32 inch	6 inches	.65	11-16 inch	6 inches	1.15	1 5-32 inch	6 inches	2.25
1-4 inch	6 inches	.70	23-32 inch	6 inches	1.20	1 3-16 inch	6 inches	2.30
9-32 inch	6 inches	.73	3-4 inch	6 inches	1.25	1 7-32 inch	6 inches	2.35
5-16 inch	6 inches	.75	25-32 inch	6 inches	1.30	1 1-4 inch	6 inches	2.40
11-32 inch	6 inches	.80	13-16 inch	6 inches	1.35	1 9-32 inch	6 inches	2.50
3-8 inch	6 inches	.85	27-32 inch	6 inches	1.40	1 5-16 inch	6 inches	2.60
13-32 inch	6 inches	.88	7-8 inch	6 inches	1.45	1 11-32 inch	6 inches	2.70
7-16 inch	6 inches	.90	29-32 inch	6 inches	1.55	1 3-8 inch	6 inches	2.80
15-32 inch	6 inches	.93	15-16 inch	6 inches	1.60	1 13-32 inch	6 inches	2.90
1-2 inch	6 inches	.95	31-32 inch	6 inches	1.70	1 7-16 inch	6 inches	3.00
17-32 inch	6 inches	.98	1 inch	6 inches	1.80	1 15-32 inch	6 inches	3.10
9-16 inch	6 inches	1.00	1 1-32 inch	6 inches	1.90	1 1-2 inch	6 inches	3.20

The above drills have shanks 2 1-4 inches long, and about 41-64 inch diameter.

Can also furnish short length drills of the above design. Shanks 2 1-4 inches long and 1-2 inch diameter.

FIG. 810.



No. 109 E.

MACHINE BITS FOR WOOD,

WITH MORSE TAPER SHANKS.

Diameter.	Length.	Price.	No. of Socket for Morse Taper.	Diameter.	Length.	Price.	No. of Socket for Morse Taper.
1-8 inch	4 9-16 inches	\$0.50	No. 1, \$1.20	15-32 inch	7 1-2 inches	\$1.10	No. 1, \$1.20
5-32 inch	4 13-16 inches	.50		1-2 inch	7 3-4 inches	1.20	
3-16 inch	5 1-16 inches	.60		17-32 inch	8 inches	1.30	
7-32 inch	5 5-16 inches	.60		9-16 inch	8 1-4 inches	1.40	
1-4 inch	6 1-8 inches	.70		19-32 inch	8 1-2 inches	1.50	
9-32 inch	6 1-4 inches	.75		5-8 inch	8 3-4 inches	1.60	No. 2, 1.80
5-16 inch	6 3-8 inches	.80		21-32 inch	9 inches	1.70	
11-32 inch	6 1-2 inches	.85		11-16 inch	9 1-4 inches	1.80	
3-8 inch	6 3-4 inches	.90		23-32 inch	9 1-2 inches	1.90	
13-32 inch	7 inches	.95		3-4 inch	9 3-4 inches	2.00	
7-16 inch	7 1-4 inches	1.00					

FIG. 811.



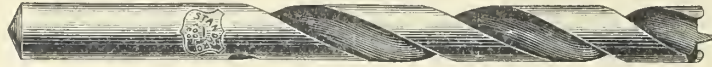
No. 109 B.

BIT STOCK COUNTERSINK.

Diameter.	Length.	Price.	Diameter.	Length.	Price.
3-8 inch	4 1-4 inches	\$0.50	3-4 inch	5 inches	\$0.90
1-2 inch	4 1-4 inches	.60	7-8 inch	5 inches	1.05
5-8 inch	4 1-4 inches	.75	1 inch	5 inches	1.20

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FIG 812.



No. 109. STRAIGHT SHANK MACHINE BITS.

FOR WOOD.

Diameter.	Length.	Price Each.	Diameter.	Length.	Price Each.
1-8 inch	3 inches	\$0 20	15-32 inch	5 3/4 inches	\$0 80
5-32 inch	3 1/4 inches	25	1/2 inch	6 inches	85
3-16 inch	3 1/2 inches	30	17-32 inch	6 1/4 inches	95
7-32 inch	3 3/4 inches	35	9-16 inch	6 1/2 inches	1 00
1/4 inch	4 inches	40	5/8 inch	6 3/4 inches	1 15
9-32 inch	4 1/4 inches	45	11-16 inch	7 inches	1 35
5-16 inch	4 1/2 inches	50	3/4 inch	7 1/4 inches	1 65
11-32 inch	4 3/4 inches	55	13-16 inch	8 inches	1 95
3/8 inch	5 inches	65	7/8 inch	8 1/2 inches	2 30
13-32 inch	5 1/4 inches	70	15-16 inch	9 inches	2 65
7-16 inch	5 1/2 inches	75	1 inch	9 1/2 inches	3 00

Price per set, with bit point, 3/8 to 1/2 inch, mounted, varying by 32ds, \$7.00

FIG. 813.



No. 113. STRAIGHT FLUTED STRAIGHT SHANK DRILLS.

Diameter.	Length.	Price per Doz.	Price Each.	Diameter.	Length.	Price per Doz.	Price Each.
1-16 inch	2 1/4 inches	\$1 00	\$0 09	19-64 inch	4 3/4 inches	\$3 90	\$0 35
5-64 inch	2 5/8 inches	1 10	10	5-16 inch	4 1/2 inches	4 20	37
3-32 inch	2 3/4 inches	1 20	11	21-64 inch	4 5/8 inches	4 50	40
7-64 inch	2 7/8 inches	1 30	12	11-32 inch	4 3/4 inches	4 80	42
1/4 inch	3 inches	1 45	13	23-64 inch	4 7/8 inches	5 10	45
9-64 inch	3 1/8 inches	1 60	15	3/8 inch	5 inches	5 40	48
5-32 inch	3 1/4 inches	1 80	16	25-64 inch	5 1/8 inches	5 70	50
11-64 inch	3 1/2 inches	2 00	18	13-32 inch	5 1/4 inches	6 00	53
3-16 inch	3 3/4 inches	2 20	20	27-64 inch	5 3/8 inches	6 40	55
13-64 inch	3 5/8 inches	2 40	21	7-16 inch	5 1/2 inches	6 80	59
7-32 inch	3 3/4 inches	2 65	23	29-64 inch	5 5/8 inches	7 20	63
15-64 inch	3 7/8 inches	2 90	26	15-32 inch	5 3/4 inches	7 50	65
1/2 inch	4 inches	3 15	28	31-64 inch	5 7/8 inches	7 75	67
17-64 inch	4 1/4 inches	3 40	30	1/2 inch	6 inches	8 00	70
9-32 inch	4 1/2 inches	3 65	32				

FIG. 814.



No. 114. STRAIGHT FLUTED TAPER SHANK DRILLS.

Diameter.	Length.	Price Each.	Socket for Morse Taper.	Diameter.	Length.	Price Each.	Socket for Morse Taper.
1/4 inch	6 1/4 inches	\$0 60	No. 1, Price, \$1 20.	3/4 inch	9 3/4 inches	\$1 85	No. 2, Price, \$1 80.
9-32 inch	6 1/2 inches	65		25-32 inch	9 7/8 inches	2 00	
5-16 inch	6 3/4 inches	70		13-16 inch	10 inches	2 15	
11-32 inch	6 1/2 inches	75		27-32 inch	10 1/4 inches	2 30	
3/8 inch	6 3/4 inches	80		7/8 inch	10 1/2 inches	2 45	
13-32 inch	7 inches	85	No. 2, Price, \$1 80.	29-32 inch	10 3/4 inches	2 60	No. 3, Price, \$2 50.
7-16 inch	7 1/4 inches	90		15-16 inch	10 1/2 inches	2 75	
15-32 inch	7 1/2 inches	95		3-32 inch	10 7/8 inches	2 90	
1/2 inch	7 3/4 inches	1 00		1 inch	11 inches	3 00	
17-32 inch	8 inches	1 10		1 1-32 inches	11 1/8 inches	3 20	
9-16 inch	8 1/4 inches	1 20		1 1-16 inches	11 1/4 inches	3 40	
19-32 inch	8 1/2 inches	1 30		1 3-32 inches	11 3/4 inches	3 60	
5/8 inch	8 3/4 inches	1 40		1 1-8 inches	11 7/8 inches	3 80	
21-32 inch	9 inches	1 50		1 5-32 inches	11 7/8 inches	4 00	
11-16 inch	9 1/4 inches	1 60		1 3-16 inches	12 inches	4 20	
23-32 inch	9 1/2 inches	1 70		1 1/4 inches	12 1/2 inches	4 50	

We furnish the above by 64ths and all sizes to 3 inches, if ordered.

FIG. 815.



No. 122.

STANDARD HAND REAMERS.

Diameter.	Full Length.	Length of Flute.	Price Each.	Diameter.	Full Length.	Length of Flute.	Price Each.
$\frac{1}{8}$ inch	3 inches	$1\frac{1}{2}$ inches	\$1.00	I 11-32 inches	12 17-32 inches	6 17-64 inches	\$5.40
5-32 inch	$3\frac{1}{4}$ inches	$1\frac{5}{8}$ inches	1.10	I 13-32 inches	12 23-32 inches	6 5-16 inches	5.60
3-16 inch	$3\frac{1}{2}$ inches	$1\frac{3}{4}$ inches	1.20	I 7-16 inches	12 13-16 inches	6 23-64 inches	5.80
7-32 inch	$3\frac{3}{4}$ inches	$1\frac{7}{8}$ inches	1.30	I 15-32 inches	12 29-32 inches	$6\frac{3}{8}$ inches	6.00
$\frac{1}{4}$ inch	4 inches	2 inches	1.40	$1\frac{1}{2}$ inches	13 inches	6 29 64 inches	6.20
9-32 inch	$4\frac{1}{4}$ inches	$2\frac{1}{8}$ inches	1.45	I 17-32 inches	13 inches	$6\frac{1}{2}$ inches	6.40
5-16 inch	$4\frac{1}{2}$ inches	$2\frac{1}{4}$ inches	1.50	I 9-16 inches	13 inches	$6\frac{1}{2}$ inches	6.60
11-32 inch	$4\frac{3}{4}$ inches	$2\frac{3}{8}$ inches	1.55	I 19-32 inches	13 inches	$6\frac{1}{2}$ inches	6.80
$\frac{3}{8}$ inch	5 inches	$2\frac{1}{2}$ inches	1.60	$1\frac{5}{8}$ inches	13 inches	$6\frac{1}{2}$ inches	7.00
I 3-32 inches	$5\frac{1}{4}$ inches	$2\frac{5}{8}$ inches	1.65	I 21-32 inches	$13\frac{1}{2}$ inches	$6\frac{1}{2}$ inches	7.20
7-16 inch	$5\frac{1}{2}$ inches	$2\frac{3}{4}$ inches	1.75	I 11-16 inches	$13\frac{1}{2}$ inches	$6\frac{3}{4}$ inches	7.40
15-32 inch	$5\frac{3}{4}$ inches	$2\frac{7}{8}$ inches	1.85	I 23-32 inches	$13\frac{1}{2}$ inches	$6\frac{3}{4}$ inches	7.60
$\frac{1}{2}$ inch	6 inches	3 inches	1.90	I 25-32 inches	$13\frac{1}{2}$ inches	$6\frac{3}{4}$ inches	7.80
17-32 inch	$6\frac{1}{4}$ inches	$3\frac{1}{8}$ inches	1.95	I 13-16 inches	$13\frac{1}{2}$ inches	$6\frac{3}{4}$ inches	8.00
9-16 inch	$6\frac{1}{2}$ inches	$3\frac{1}{4}$ inches	2.00	I 27-32 inches	$13\frac{1}{2}$ inches	$6\frac{3}{4}$ inches	8.20
19-32 inch	$6\frac{3}{4}$ inches	$3\frac{3}{8}$ inches	2.10	$1\frac{7}{8}$ inches	14 inches	$6\frac{3}{4}$ inches	8.40
$\frac{5}{8}$ inch	7 inches	$3\frac{1}{2}$ inches	2.20	I 29-32 inches	14 inches	$6\frac{3}{4}$ inches	8.60
21-32 inch	7 11-32 inches	3 43-64 inches	2.30	I 15-16 inches	14 inches	7 inches	8.80
11-16 inch	7 11-16 inches	3 13-16 inches	2.40	I 31-32 inches	14 inches	7 inches	9.00
23-32 inch	$8\frac{1}{8}$ inches	4 1-16 inches	2.50	2 inches	14 inches	7 inches	9.20
$\frac{3}{4}$ inch	$8\frac{3}{8}$ inches	4 3-16 inches	2.60	2 1-16 inches	14 inches	7 inches	9.40
25-32 inch	8 23-32 inches	4 23-64 inches	2.70	$2\frac{1}{8}$ inches	14 inches	7 inches	9.60
13-16 inch	9 1-16 inches	$4\frac{1}{2}$ inches	2.80	$2\frac{1}{4}$ inches	14 inches	7 inches	9.80
27-32 inch	$9\frac{3}{8}$ inches	4 11-16 inches	2.95	2 5-16 inches	14 inches	7 inches	10.00
$\frac{7}{8}$ inch	9 11-16 inches	4 13-16 inches	3.10	$2\frac{3}{8}$ inches	14 inches	7 inches	10.50
29-32 inch	10 3-32 inches	5 3-64 inches	3.25	2 7-16 inches	$14\frac{1}{2}$ inches	7 inches	11.00
15-16 inch	$10\frac{1}{4}$ inches	$5\frac{1}{8}$ inches	3.40	$2\frac{1}{2}$ inches	$14\frac{1}{2}$ inches	$7\frac{1}{4}$ inches	11.60
31-32 inch	10 11-16 inches	5 11-32 inches	3.55	$2\frac{3}{4}$ inches	$14\frac{1}{2}$ inches	$7\frac{1}{4}$ inches	12.20
I inch	$10\frac{7}{8}$ inches	5 7-16 inches	3.70	2 9-16 inches	$14\frac{1}{2}$ inches	$7\frac{1}{4}$ inches	12.85
I 1-32 inches	11 1-16 inches	5 17-32 inches	3.85	$2\frac{5}{8}$ inches	$14\frac{1}{2}$ inches	$7\frac{1}{4}$ inches	13.50
I 1-16 inches	$11\frac{1}{4}$ inches	$5\frac{5}{8}$ inches	4.00	2 11-16 inches	$14\frac{1}{2}$ inches	$7\frac{1}{4}$ inches	14.15
I 3-32 inches	11 7-16 inches	5 23-32 inches	4.15	$2\frac{3}{4}$ inches	15 inches	$7\frac{1}{2}$ inches	14.85
$1\frac{1}{8}$ inches	$11\frac{3}{8}$ inches	5 13-16 inches	4.30	2 13-16 inches	15 inches	$7\frac{1}{2}$ inches	15.55
I 5-32 inches	11 13-16 inches	6 29-32 inches	4.45	$2\frac{7}{8}$ inches	15 inches	$7\frac{1}{2}$ inches	16.25
I 3-16 inches	12 inches	6 inches	4.60	3 inches	15 inches	$7\frac{1}{2}$ inches	17.00
I 7-32 inches	$12\frac{1}{4}$ inches	6 1-16 inches	4.75			$7\frac{1}{2}$ inches	17.75
$1\frac{1}{4}$ inches	$12\frac{1}{2}$ inches	$6\frac{1}{8}$ inches	4.90			$7\frac{1}{2}$ inches	18.50
I 9-32 inches	12 11-32 inches	6 11-64 inches	5.05			$7\frac{1}{2}$ inches	19.25
I 5-16 inches	12 7-16 inches	6 3-16 inches	5.20				

FIG. 816A.



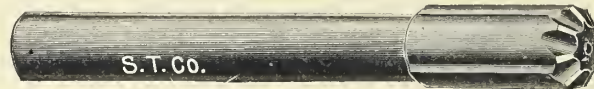
No. 122 A.

SELF-FEEDING HAND REAMERS.

Diameter.	Length.	Length of Flute.	Price Each.	Diameter.	Length.	Length of Flute.	Price Each.
$\frac{1}{4}$ inch	4 inches	2 inches	\$1.40	31-32 inch	$10\frac{1}{2}$ inches	5 5-16 inches	3.55
9-32 inch	$4\frac{1}{4}$ inches	$2\frac{1}{8}$ inches	1.45	$1\frac{1}{8}$ inch	$10\frac{3}{4}$ inches	5 7-16 inches	3.70
5-16 inch	$4\frac{1}{2}$ inches	$2\frac{1}{4}$ inches	1.50	I 1-32 inches	11 inches	$5\frac{1}{8}$ inches	3.85
11-32 inch	$4\frac{3}{4}$ inches	$2\frac{3}{8}$ inches	1.55	I 1-16 inches	$11\frac{1}{4}$ inches	$5\frac{3}{8}$ inches	4.00
$\frac{3}{8}$ inch	5 inches	$2\frac{1}{2}$ inches	1.60	I 1-32 inches	$11\frac{3}{8}$ inches	5 11-16 inches	4.15
13-32 inch	$5\frac{1}{4}$ inches	$2\frac{5}{8}$ inches	1.65	$1\frac{1}{4}$ inches	$11\frac{3}{8}$ inches	5 13-16 inches	4.30
7-16 inch	$5\frac{1}{2}$ inches	$2\frac{3}{4}$ inches	1.75	I 5-32 inches	11 13-16 inches	$5\frac{7}{8}$ inches	4.45
15-32 inch	$5\frac{3}{4}$ inches	$2\frac{7}{8}$ inches	1.85	I 3-16 inches	12 inches	6 inches	4.60
$\frac{1}{2}$ inch	6 inches	3 inches	1.90	I 7-32 inches	$12\frac{1}{8}$ inches	6 1-16 inches	4.75
17-32 inch	$6\frac{1}{4}$ inches	$3\frac{1}{8}$ inches	1.95	$1\frac{1}{2}$ inches	$12\frac{1}{4}$ inches	$6\frac{1}{8}$ inches	4.90
9-16 inch	$6\frac{1}{2}$ inches	$3\frac{1}{4}$ inches	2.00	15-16 inches	12 7-16 inches	6 3-16 inches	5.20
19-32 inch	$6\frac{3}{4}$ inches	$3\frac{3}{8}$ inches	2.10	$1\frac{3}{8}$ inches	$12\frac{3}{8}$ inches	6 5-16 inches	5.60
$\frac{5}{8}$ inch	7 inches	$3\frac{1}{2}$ inches	2.20	I 7-16 inches	12 13-16 inches	$6\frac{3}{8}$ inches	6.00
21-32 inch	$7\frac{1}{8}$ inches	$3\frac{5}{8}$ inches	2.30	$1\frac{1}{2}$ inches	13 inches	$6\frac{1}{2}$ inches	6.40
11-16 inch	7 11-16 inches	3 13-16 inches	2.40	I 9-16 inches	13 inches	$6\frac{1}{2}$ inches	6.80
23-32 inch	8 inches	4 inches	2.50	$1\frac{5}{8}$ inches	13 inches	$6\frac{1}{2}$ inches	7.20
$\frac{3}{4}$ inch	$8\frac{3}{8}$ inches	4 3-16 inches	2.60	I 11-16 inches	$13\frac{1}{4}$ inches	$6\frac{3}{4}$ inches	7.60
25-32 inch	8 11-16 inches	4 5-16 inches	2.70	$1\frac{3}{4}$ inches	$13\frac{1}{2}$ inches	$6\frac{3}{4}$ inches	8.00
13-16 inch	9 11-16 inches	$4\frac{1}{2}$ inches	2.80	I 13-16 inches	$13\frac{3}{8}$ inches	$6\frac{3}{4}$ inches	8.40
27-32 inch	$9\frac{3}{8}$ inches	$4\frac{5}{8}$ inches	2.95	$1\frac{7}{8}$ inches	14 inches	7 inches	8.80
$\frac{7}{8}$ inch	9 11-16 inches	4 13-16 inches	3.10	I 15-16 inches	14 inches	$7\frac{1}{8}$ inches	9.20
29-32 inch	10 inches	5 inches	3.25	2 inches	14 inches	7 inches	9.60
15-16 inch	$10\frac{1}{4}$ inches	$5\frac{1}{8}$ inches	3.40				

PRENTISS TOOL & SUPPLY CO.

FIG. 816.



No. 124 A.

ROSE CHUCKING REAMERS.

Diameter.	Length.	Price, Each.	Diameter.	Length.	Price, Each.	Diameter.	Length.	Price, Each.
1-4 inch	6 inches	\$0 80	29-32 inch	10 inches	\$1 90	1 7-8 inch	14 inches	\$4 20
9-32 inch	6 inches	85	15-16 inch	10 inches	1 95	1 15-16 inch	14 inches	4 40
5-16 inch	6 inches	90	31-32 inch	10 inches	2 05	2 inches	14 inches	4 60
11-32 inch	6 inches	95	1 inch	10 1-2 inches	2 10	2 1-16 inches	14 1-2 inches	4 90
3-8 inch	7 inches	1 00	1 1-32 inch	10 1-2 inches	2 20	2 1-8 inches	14 1-2 inches	5 20
13-32 inch	7 inches	1 05	1 1-16 inch	10 1-2 inches	2 25	2 3-16 inches	14 1-2 inches	5 50
7-16 inch	7 inches	1 10	1 3-32 inch	10 1-2 inches	2 35	2 1-4 inches	14 1-2 inches	5 80
15-32 inch	7 inches	1 15	1 1-8 inch	11 inches	2 40	2 5-16 inches	15 inches	6 10
1-2 inch	8 inches	1 20	1 5-32 inch	11 inches	2 50	2 3-8 inches	15 inches	6 40
17-32 inch	8 inches	1 25	1 3-16 inch	11 inches	2 55	2 7-16 inches	15 inches	6 80
9-16 inch	8 inches	1 30	1 7-32 inch	11 inches	2 65	2 1-2 inches	15 inches	7 20
19-32 inch	8 inches	1 35	1 1-4 inch	11 1-2 inches	2 70	2 9-16 inches	15 1-2 inches	7 50
5-8 inch	9 inches	1 40	1 5-16 inch	11 1-2 inches	2 85	2 5-8 inches	15 1-2 inches	7 80
21-32 inch	9 inches	1 45	1 3-8 inch	12 inches	3 00	2 11-16 inches	15 1-2 inches	8 10
11-16 inch	9 inches	1 50	1 7-16 inch	12 inches	3 15	2 3-4 inches	15 1-2 inches	8 40
23-32 inch	9 inches	1 55	1 1-2 inch	12 1-2 inches	3 30	2 13-16 inches	16 inches	8 80
3-4 inch	9 1-2 inches	1 60	1 9-16 inch	12 1-2 inches	3 45	2 7-8 inches	16 inches	9 20
25-32 inch	9 1-2 inches	1 65	1 5-8 inch	13 inches	3 60	2 15-16 inches	16 inches	9 60
13-16 inch	9 1-2 inches	1 70	1 11-16 inch	13 inches	3 75	3 inches	16 inches	10 00
27-32 inch	9 1-2 inches	1 75	1 3-4 inch	13 1-2 inches	3 90			
7-8 inch	10 inches	1 80	1 13-16 inch	13 1-2 inches	4 05			

FIG. 817.

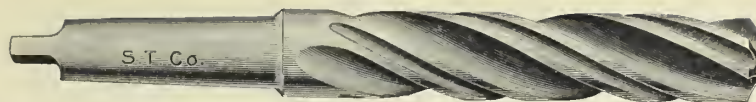


No. 122 B.

JOBBER'S REAMERS WITH MORSE TAPER SHANKS.

Diameter.	Length.	Length of Flute.	Price, Each.	Socket for Morse Taper.	Diameter.	Length.	Length of Flute.	Price, Each.	Socket for Morse Taper.
1-4 inch	5 3-16 inches	2 inches	\$1 50	No. 1, \$1 20	1 13-32 inch	12 13-16 inches	6 5-16 inches	\$5 90	No. 4, \$4 00
9-32 inch	5 3-16 inches	2 inches	1 55		1 7-16 inch	13 inches	6 7-16 inches	6 10	
5-16 inch	5 1-2 inches	2 1-4 inches	1 60		1 15-32 inch	13 inches	6 7-16 inches	6 30	
11-32 inch	5 1-2 inches	2 1-4 inches	1 65		1 1-2 inch	13 1-8 inches	6 1-2 inches	6 50	
3-8 inch	5 13-16 inches	2 1-2 inches	1 70		1 17-32 inch	13 1-8 inches	6 1-2 inches	6 70	
13-32 inch	5 13-16 inches	2 1-2 inches	1 80		1 9-16 inch	13 1-8 inches	6 1-2 inches	6 90	
7-16 inch	6 1-8 inches	2 3-4 inches	1 85		1 19-32 inch	13 1-8 inches	6 1-2 inches	7 10	
15-32 inch	6 1-8 inches	2 3-4 inches	1 95		1 5-8 inch	13 1-8 inches	6 1-2 inches	7 30	
1-2 inch	6 7-16 inches	3 inches	2 00		1 21-32 inch	13 1-8 inches	6 1-2 inches	7 50	
17-32 inch	6 7-16 inches	3 inches	2 10		1 11-16 inch	14 11-16 inches	6 3-4 inches	7 70	
9-16 inch	6 3-4 inches	3 1-4 inches	2 15	No. 2, \$1 80	1 23-32 inch	14 11-16 inches	6 3-4 inches	7 85	No. 5, \$7 50
19-32 inch	6 3-4 inches	3 1-4 inches	2 25		1 3-4 inch	14 11-16 inches	6 3-4 inches	8 00	
5-8 inch	7 9-16 inches	3 1-2 inches	2 30		1 25-32 inch	14 11-16 inches	6 3-4 inches	8 20	
21-32 inch	7 9-16 inches	3 1-2 inches	2 40		1 13-16 inch	14 11-16 inches	6 3-4 inches	8 40	
11-16 inch	8 inches	3 7-8 inches	2 50		1 27-32 inch	14 11-16 inches	6 3-4 inches	8 60	
23-32 inch	8 inches	3 7-8 inches	2 60		1 7-8 inch	15 inches	7 inches	8 80	
3-4 inch	8 3-8 inches	4 3-16 inches	2 70		1 29-32 inch	15 inches	7 inches	9 00	
25-32 inch	8 3-8 inches	4 3-16 inches	2 80		1 15-16 inch	15 inches	7 inches	9 20	
13-16 inch	8 13-16 inches	4 9-16 inches	2 90		1 31-32 inch	15 inches	7 inches	9 40	
27-32 inch	8 13-16 inches	4 9-16 inches	3 05		2 inches	15 inches	7 inches	9 60	
7-8 inch	9 3-16 inches	4 7-8 inches	3 20	No. 3, \$2 50	2 1-16 inches	15 1-2 inches	7 1-4 inches	10 00	
29-32 inch	9 3-16 inches	4 7-8 inches	3 35		2 1-8 inches	15 1-2 inches	7 1-4 inches	10 40	
15-16 inch	10 inches	5 1-8 inches	3 50		2 3-16 inches	15 1-2 inches	7 1-4 inches	10 80	
31-32 inch	10 inches	5 1-8 inches	3 65		2 1-4 inches	15 1-2 inches	7 1-4 inches	11 30	
1 inch	10 3-8 inches	5 7-16 inches	3 80		2 5-16 inches	16 inches	7 1-2 inches	11 80	
1 1-32 inch	10 3-8 inches	5 7-16 inches	3 95		2 3-8 inches	16 inches	7 1-2 inches	12 30	
1 1-16 inch	10 5-8 inches	5 5-8 inches	4 10		2 7-16 inches	16 inches	7 1-2 inches	12 80	
1 3-32 inch	10 5-8 inches	5 5-8 inches	4 25		2 1-2 inches	16 inches	7 1-2 inches	13 40	
1 1-8 inch	10 7-8 inches	5 13-16 inches	4 40		2 9-16 inches	16 1-2 inches	7 3-4 inches	14 00	
1 5-32 inch	10 7-8 inches	5 13-16 inches	4 55		2 5-8 inches	16 1-2 inches	7 3-4 inches	14 60	
1 3-16 inch	11 1-8 inches	6 inches	4 70	No. 4, \$4 00	2 11-16 inches	16 1-2 inches	7 3-4 inches	15 40	
1 7-32 inch	11 1-8 inches	6 inches	4 85		2 3-4 inches	16 1-2 inches	7 3-4 inches	16 20	
1 1-4 inch	11 5-8 inches	6 1-8 inches	5 00		2 13-16 inches	17 inches	8 inches	17 00	
1 9-32 inch	11 5-8 inches	6 1-8 inches	5 15		2 7-8 inches	17 inches	8 inches	17 80	
1 5-16 inch	12 11-16 inches	6 1-4 inches	5 30		2 15-16 inches	17 inches	8 inches	18 60	
1 11-32 inch	12 11-16 inches	6 1-4 inches	5 50		3 inches	17 inches	8 inches	19 40	
1 3-8 inch	12 13-16 inches	6 5-16 inches	5 70						

FIG. 818.



No. 124 D.

THREE GROOVE CHUCKING REAMER.

Diameter, Inches.	Length, Inches.	Length of Flutes, Inches.	Price.	Socket for Morse Taper.	Diameter, Inches.	Length, Inches.	Length of Flutes, Inches.	Price.	Socket for Morse Taper.
3-8	6 3-4	4	\$1 70	No. 2.	1 1-4	16	10 1-2	\$4 80	No. 4.
7-16	7 1-4	4 1-2	1 80		1 5-16	16	10 1-2	5 20	
1-2	8	5	1 90		1 3-8	16	10 1-2	5 60	
9-16	9	6	2 00		1 7-16	16	10 1-2	6 00	
5-8	13	9	2 60		1 1-2	16	10 1-2	6 40	
11-16	13	9	2 75		1 9-16	16	10 1-2	6 90	
3-4	13	9	2 90		1 5-8	16	10 1-2	7 40	
13-16	13	9	3 05		1 11-16	16	10 1-2	7 90	
7-8	13	9	3 20		1 3-4	16	10	8 40	
15-16	13	9	3 40		1 13-16	16	10	8 80	
1	13	9	3 60	No. 3.	1 7-8	16	10	9 20	No. 5.
1 1-16	13	9	3 80		1 15-16	16	10	9 50	
1 1-8	13	9	4 00		2	16	10	9 80	
1 3-16	16	10 1-2	4 50						

These chucking reamers are furnished with taper or straight shanks, and are 1-64 inch under size, unless otherwise ordered. Special lengths made to order.

FIG. 819.

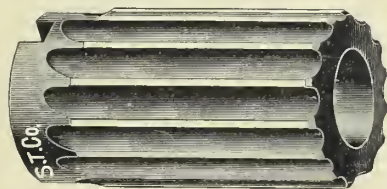
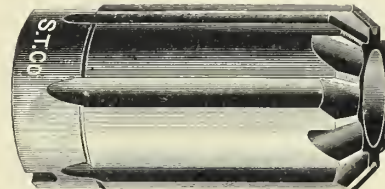


FIG. 819 A.



No. 123.

STANDARD SHELL REAMERS.

Diameter, Inches.	Length, Inches.	Size Hole, Inches.	Price, Each.	Diameter, Inches.	Length, Inches.	Size Hole, Inches.	Price, Each.
1-4	1 1-2	1-8	\$1 10	2 13-16	4	1 1-2	\$8 40
5-16	1 1-2	1-8	1 10	2 7-8	4	1 1-2	8 80
3-8	1 3-4	3-16	1 20	2 15-16	4	1 1-2	9 20
7-16	1 3-4	3-16	1 30	3	4	1 1-2	9 60
1-2	2	1-4	1 40	3 1-16	4 1-2	1 3-4	9 90
9-16	2	1-4	1 50	3 1-8	4 1-2	1 3-4	10 20
5-8	2 1-4	3-8	1 60	3 3-16	4 1-2	1 3-4	10 60
11-16	2 1-4	3-8	1 60	3 1-4	4 1-2	1 3-4	11 00
3-4	2 1-2	1-2	1 60	3 5-16	4 1-2	1 3-4	11 50
13-16	2 1-2	1-2	1 60	3 3-8	4 1-2	1 3-4	12 00
7-8	2 1-2	1-2	1 70	3 7-16	4 1-2	1 3-4	12 50
15-16	2 1-2	1-2	1 70	3 1-2	4 1-2	1 3-4	13 00
1	2 3-4	5-8	1 80	3 9-16	5	2	13 50
1 1-16	2 3-4	5-8	1 80	3 5-8	5	2	14 00
1 1-8	2 3-4	5-8	1 90	3 11-16	5	2	14 50
1 3-16	2 3-4	5-8	2 00	3 3-4	5	2	15 00
1 1-4	2 3-4	5-8	2 20	3 13-16	5	2	15 50
1 5-16	3	3-4	2 40	3 7-8	5	2	16 00
1 3-8	3	3-4	2 60	3 15-16	5	2	17 00
1 7-16	3	3-4	2 80	4	5	2	18 00
1 1-2	3	3-4	3 00	4 1-16	5 1-2	2 1-4	18 30
1 9-16	3	3-4	3 20	4 1-8	5 1-2	2 1-4	18 60
1 5-8	3	3-4	3 50	4 3-16	5 1-2	2 1-4	19 00
1 11-16	3 1-2	1	3 80	4 1-4	5 1-2	2 1-4	19 40
1 3-4	3 1-2	1	4 10	4 5-16	5 1-2	2 1-4	19 80
1 13-16	3 1-2	1	4 40	4 3-8	5 1-2	2 1-4	20 20
1 7-8	3 1-2	1	4 70	4 7-16	5 1-2	2 1-4	20 60
1 15-16	3 1-2	1	5 00	4 1-2	5 1-2	2 1-4	21 00
2	3 1-2	1	5 20	4 9-16	5 1-2	2 1-4	21 60
2 1-16	3 3-4	1 1-4	5 40	4 5-8	6	2 1-2	22 20
2 1-8	3 3-4	1 1-4	5 60	4 11-16	6	2 1-2	22 80
2 3-16	3 3-4	1 1-4	5 80	4 3-4	6	2 1-2	23 40
2 1-4	3 3-4	1 1-4	6 00	4 13-16	6	2 1-2	24 00
2 5-16	3 3-4	1 1-4	6 20	4 7-8	6	2 1-2	24 60
2 3-8	3 3-4	1 1-4	6 40	4 15-16	6	2 1-2	25 20
2 7-16	3 3-4	1 1-4	6 60	5	6	2 1-2	26 00
2 1-2	3 3-4	1 1-4	6 80	5 1-4	6	2 1-2	30 00
2 9-16	4	1 1-2	7 00	5 1-2	6	2 1-2	34 00
2 5-8	4	1 1-2	7 30	5 3-4	6	2 1-2	38 00
2 11-16	4	1 1-2	7 60	6	6	2 1-2	42 00
2 3-4	4	1 1-2	8 00				

Shell Reamers of any size or length made to order.

FIG. 820.



No. 124 B.

FLUTED CHUCKING REAMERS,

WITH MORSE TAPER SHANKS.

Diameter.	Length.	Length of Flute.	Price Each.	Socket for Morse Taper.	Diameter.	Length.	Length of Flute.	Price Each.	Socket for Morse Taper.
$\frac{1}{4}$ inch	6 inches	$\frac{7}{8}$ inch	\$1.20	No. 1.	1 7-32 inches	11 inches	$1\frac{3}{4}$ inches	\$3.40	No. 3.
9-32 inch	6 inches	$\frac{7}{8}$ inch	1.20		1 $\frac{1}{4}$ inches	11 $\frac{1}{2}$ inches	$1\frac{7}{8}$ inches	3.50	
5-16 inch	6 inches	$\frac{7}{8}$ inch	1.30		1 5-16 inches	11 $\frac{1}{2}$ inches	$1\frac{7}{8}$ inches	3.70	
11-32 inch	6 inches	$\frac{7}{8}$ inch	1.30		1 $\frac{3}{8}$ inches	12 inches	2 inches	3.95	
$\frac{3}{8}$ inch	7 inches	1 inch	1.45		1 7-16 inches	12 inches	2 inches	4.15	
13-32 inch	7 inches	1 inch	1.50		1 $\frac{1}{2}$ inches	12 $\frac{1}{2}$ inches	$2\frac{1}{8}$ inches	4.40	
7-16 inch	7 inches	1 inch	1.55		1 9-16 inches	12 $\frac{1}{2}$ inches	$2\frac{1}{8}$ inches	4.60	
15-32 inch	7 inches	1 inch	1.60		1 $\frac{5}{8}$ inches	13 inches	$2\frac{1}{4}$ inches	4.85	
$\frac{1}{2}$ inch	8 inches	$1\frac{1}{8}$ inches	1.65		1 11-16 inches	13 inches	$2\frac{1}{4}$ inches	5.10	
17-32 inch	8 inches	$1\frac{1}{8}$ inches	1.70		1 $\frac{3}{4}$ inches	13 $\frac{1}{2}$ inches	$2\frac{3}{8}$ inches	5.30	
9-16 inch	8 inches	$1\frac{1}{8}$ inches	1.75	No. 2.	1 13-16 inches	13 $\frac{1}{2}$ inches	$2\frac{3}{8}$ inches	5.50	No. 4.
19-32 inch	8 inches	$1\frac{1}{8}$ inches	1.80		1 $\frac{7}{8}$ inches	14 inches	$2\frac{1}{2}$ inches	5.70	
$\frac{5}{8}$ inch	9 inches	$1\frac{1}{4}$ inches	1.90		1 15-16 inches	14 inches	$2\frac{1}{2}$ inches	5.95	
21-32 inch	9 inches	$1\frac{1}{4}$ inches	1.95		2 inches	14 inches	$2\frac{1}{2}$ inches	6.20	
11-16 inch	9 inches	$1\frac{1}{4}$ inches	2.00		2 1-16 inches	14 $\frac{1}{2}$ inches	$2\frac{3}{4}$ inches	6.50	
23-32 inch	9 inches	$1\frac{1}{4}$ inches	2.10		2 $\frac{1}{8}$ inches	14 $\frac{1}{2}$ inches	$2\frac{3}{4}$ inches	6.80	
$\frac{3}{4}$ inch	9 $\frac{1}{2}$ inches	$1\frac{3}{8}$ inches	2.20		2 3-16 inches	14 $\frac{1}{2}$ inches	$2\frac{3}{4}$ inches	7.10	
25-32 inch	9 $\frac{1}{2}$ inches	$1\frac{3}{8}$ inches	2.30		2 $\frac{1}{4}$ inches	14 $\frac{1}{2}$ inches	$2\frac{3}{4}$ inches	7.40	
13-16 inch	9 $\frac{1}{2}$ inches	$1\frac{3}{8}$ inches	2.40		2 5-16 inches	15 inches	3 inches	7.70	
27-32 inch	9 $\frac{1}{2}$ inches	$1\frac{3}{8}$ inches	2.50		2 $\frac{3}{8}$ inches	15 inches	3 inches	8.00	
$\frac{7}{8}$ inch	10 inches	$1\frac{1}{2}$ inches	2.55	No. 3.	2 7-16 inches	15 inches	3 inches	8.40	No. 5.
29-32 inch	10 inches	$1\frac{1}{2}$ inches	2.60		2 $\frac{1}{2}$ inches	15 inches	3 inches	8.80	
15-16 inch	10 inches	$1\frac{1}{2}$ inches	2.65		2 9-16 inches	15 $\frac{1}{2}$ inches	$3\frac{1}{4}$ inches	9.20	
31-32 inch	10 inches	$1\frac{1}{2}$ inches	2.70		2 $\frac{5}{8}$ inches	15 $\frac{1}{2}$ inches	$3\frac{1}{4}$ inches	9.60	
1 inch	10 $\frac{1}{2}$ inches	$1\frac{5}{8}$ inches	2.75		2 11-16 inches	15 $\frac{1}{2}$ inches	$3\frac{1}{4}$ inches	10.00	
1 1-32 inches	10 $\frac{1}{2}$ inches	$1\frac{5}{8}$ inches	2.80		2 $\frac{3}{4}$ inches	15 $\frac{1}{2}$ inches	$3\frac{1}{4}$ inches	10.40	
1 1-16 inches	10 $\frac{1}{2}$ inches	$1\frac{5}{8}$ inches	2.85		2 13-16 inches	16 inches	$3\frac{1}{2}$ inches	10.80	
1 3-32 inches	10 $\frac{1}{2}$ inches	$1\frac{5}{8}$ inches	2.95		2 $\frac{7}{8}$ inches	16 inches	$3\frac{1}{2}$ inches	11.20	
1 $\frac{1}{8}$ inches	11 inches	$1\frac{3}{4}$ inches	3.10		2 15-16 inches	16 inches	$3\frac{1}{2}$ inches	11.60	
1 5-32 inches	11 inches	$1\frac{3}{4}$ inches	3.20		3 inches	16 inches	$3\frac{1}{2}$ inches	12.00	
1 3-16 inches	11 inches	$1\frac{3}{4}$ inches	3.30						

FIG. 821.

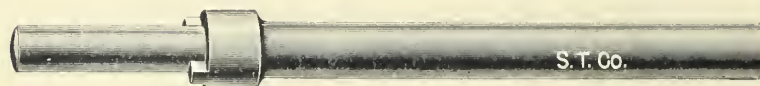


No. 128.

BIT STOCK TAPER REAMERS.

Diameter,	$\frac{1}{4}$ inch	5-16 inch	$\frac{3}{8}$ inch	7-16 inch	$\frac{1}{2}$ inch	9-16 inch	$\frac{5}{8}$ inch	11-16 inch	$\frac{3}{4}$ inch
Price,	\$.45	.50	.55	.60	.70	.80	.90	1.05	1.20

FIG. 822.



No. 130.

ARBORS FOR SHELL REAMERS.

No.	Fitting Sizes.	Full Length.	Price Each.	No.	Fitting Sizes.	Full Length.	Price Each.
1	$\frac{1}{4}$ to 5-16 inch	6 inches	\$1.20	8	1 11-16 to 2 inches	12 inches	\$2.70
2	$\frac{3}{8}$ to 7-16 inch	7 inches	1.40	9	2 1-16 to $2\frac{1}{2}$ inches	13 inches	3.00
3	$\frac{1}{2}$ to 9-16 inch	8 inches	1.60	10	2 9-16 to 3 inches	14 inches	3.40
4	$\frac{5}{8}$ to 11-16 inch	9 inches	1.80	11	3 1-16 to $3\frac{1}{2}$ inches	15 inches	
5	$\frac{3}{4}$ to 15-16 inch	9 $\frac{1}{2}$ inches	2.00	12	3 9-16 to 4 inches	16 inches	
6	1 to $1\frac{1}{4}$ inches	10 inches	2.20	13	4 1-16 to $4\frac{1}{2}$ inches	17 inches	
7	1 5-16 to $1\frac{3}{8}$ inches	11 inches	2.40	14	4 9-16 to 5 inches	18 inches	

PRENTISS TOOL & SUPPLY CO.

FIG. 823.



FIG. 823 A.



FIG. 823 B.



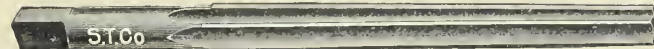
STEEL SOCKETS FOR TAPER SHANK DRILLS.

No. 1 holds 1-4 to 19-32 inch, inclusive,	\$1 20
No. 2 holds 5-8 to 29-32 inch, inclusive,	1 80
No. 3 holds 15-16 to 1 1-4 inch, inclusive,	2 50
No. 4 holds 1 9-32 to 2 inches, inclusive,	4 00
No. 5 holds 2 1-16 to 2 1-2 inches, inclusive,	7 50
No. 1, with shank fitted to No. 2 or 3 socket,	2 00
No. 2, with shank fitted to No. 3 socket,	2 50
No. 3, with shank fitted to No. 4 socket,	3 20
No. 4, with shank fitted to No. 5 socket,	4 80

STEEL SOCKETS OR SLEEVES FOR TAPER SHANK DRILLS.

No. 1, fitted to No. 2 or 3 socket,	\$1 80
No. 2, fitted to No. 3 socket,	2 40
No. 3, fitted to No. 4 socket,	3 00
No. 4, fitted to No. 5 socket,	4 40

FIG. 824.



No. 126.

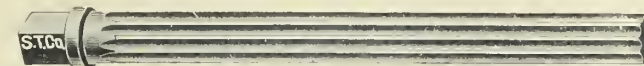
STANDARD TAPER PIN REAMERS.

Taper 1/4 inch per foot.

Size No.	Diameter at Small End.	Length of Flute.	Total Length.	Price, Each.	Size No.	Diameter at Small End.	Length of Flute.	Total Length.	Price, Each.
0	0.125 inch	1 1-2 inches	2 1-4 inches	\$1 00	6	0.279 inch	3 5-8 inches	5 inches	\$2 25
1	0.146 "	1 3-4 "	2 1-2 "	1 00	7	0.331 "	4 1-2 "	6 "	2 50
2	0.162 "	2 "	3 "	1 25	8	0.398 "	5 1-4 "	6 3-4 "	3 00
3	0.183 "	2 1-4 "	3 1-2 "	1 50	9	0.482 "	6 1-8 "	8 "	3 50
4	0.208 "	2 1-2 "	4 "	1 75	10	0.581 "	7 "	9 "	4 00
5	0.240 "	3 "	4 1-2 "	2 00					

These Reamers have the same taper, and each will overlay in convenient measure the size next smaller. Special sizes made to order.

FIG. 825.



No. 127.

STANDARD TAPER REAMERS,

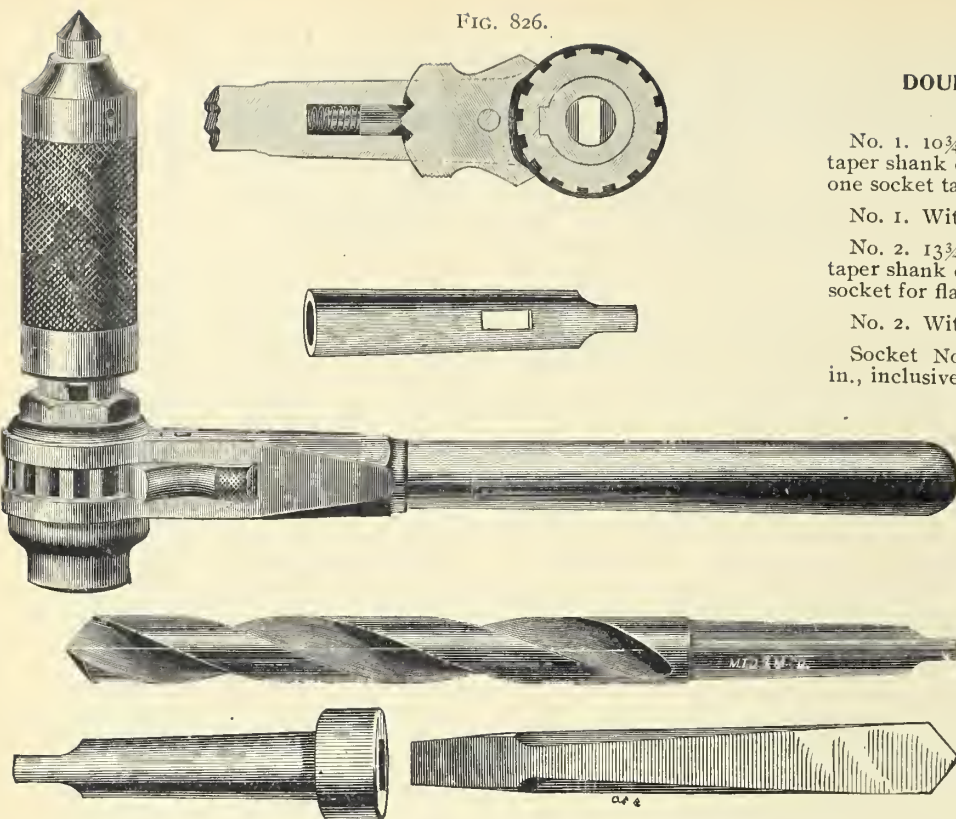
FOR LOCOMOTIVE WORK.

Taper 1-16 inch per foot.

Diameter at End.	Length of Flute.	Total Length.	Price, Each.	Diameter at End.	Length of Flute.	Total Length.	Price, Each.
1-4 inch	4 inches	5 5-16 inches	\$2 20	13-16 inch	9 inches	11 1-4 inches	\$4 50
9-32 "	4 "	5 5-16 "	2 20	7-8 "	9 "	11 1-4 "	4 80
5-16 "	4 "	5 5-16 "	2 25	15-16 "	9 "	11 1-4 "	5 10
11-32 "	4 "	5 5-16 "	2 25	1 "	9 "	11 1-4 "	5 40
3-8 "	5 "	6 5-16 "	2 30	1 1-16 "	9 "	11 1-4 "	5 70
13-32 "	5 "	6 5-16 "	2 40	1 1-8 "	10 "	12 1-4 "	6 20
7-16 "	6 "	7 5-16 "	2 55	1 3-16 "	10 "	12 1-4 "	6 60
15-32 "	6 "	7 5-16 "	2 70	1 1-4 "	10 "	12 1-4 "	7 00
1-2 "	7 "	8 5-8 "	3 00	1 5-16 "	12 "	14 1-2 "	7 60
9-16 "	8 "	9 5-8 "	3 20	1 3-8 "	12 "	14 1-2 "	8 00
5-8 "	8 "	9 7-8 "	3 50	1 7-16 "	12 "	14 1-2 "	8 50
11-16 "	8 "	9 7-8 "	3 80	1 1-2 "	12 "	14 1-2 "	9 00
3-4 "	8 "	9 7-8 "	4 10				

Reamers of other taper per foot than as specified above, furnished as desired.

FIG. 826.

**DOUBLE-ACTING RACHET DRILLS.**

No. 1. 10 $\frac{3}{4}$ inch handle, with one socket taking Morse taper shank drills, from $\frac{1}{4}$ inch to $\frac{3}{8}$ inch, inclusive, and one socket taking flat drills, \$14.00.

No. 1. Without the two sockets, \$11.00.

No. 2. 13 $\frac{3}{4}$ inch handle, with one socket taking Morse taper shank drills, from $\frac{5}{8}$ to 1 $\frac{1}{4}$ inch, inclusive, and one socket for flat drills, \$17.00.

No. 2. Without the two sockets, \$14.00.

Socket No. 1, for taper shank drills, from $\frac{1}{4}$ to $\frac{1}{2}$ in., inclusive, \$1.50.

Socket, No. 2, for taper shank drills, from $\frac{5}{8}$ to $\frac{3}{2}$ in., inclusive, \$2.00.

Socket No. 3, for flat drill, for No. 1 Ratchet, \$1.75.

Socket No. 4, for flat drill, for No. 2 ratchet, \$1.75.

Socket No. 1 is fitted with taper shank to slide into No. 2 socket, and purchasers procuring the No. 2 ratchet, with the three sockets, can use the whole list of drills. The sockets used in these drills can be used for lathe work, being of correct taper for the Morse taper shank drills.

TWIST DRILL AND STEEL WIRE GAUGE.

FIG. 827. No. 119.

Price, - - - - - \$1.25

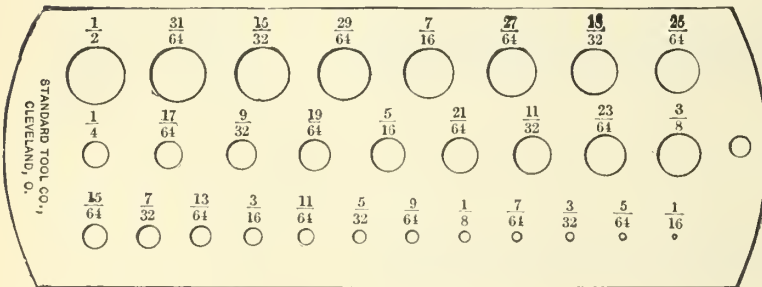
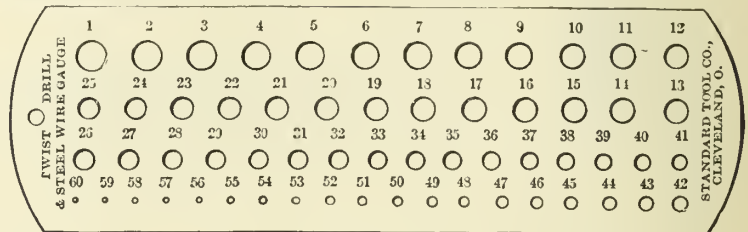
**JOBBER'S DRILL GAUGE.**

FIG. 828. No. 120.

Price, - - - - - \$2.25.

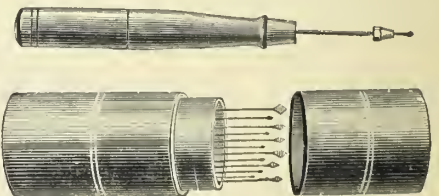
**AUTOMATIC DRILL STOCK No. 1.**

FIG. 829.

Price, with 12 drill points, assorted, per dozen, - - - - - \$9 00.

**AUTOMATIC DRILL No. 2.**

FIG. 830.

No. 2 is a larger size, with hollow handle, and includes a set of 8 drill points the same size as shown in Fig. 829.

Price, with eight drill points, per dozen, \$18.00.

PACKER RATCHET DRILLS.

WITH TAPER HOLE IN SOCKET.

No. 2.	12 inch handle, taking No. 1 Morse taper socket or Morse taper shank drills, from $\frac{5}{8}$ to 29-32 inches, inclusive,	\$16.00
No. 3.	15 inch handle, taking No. 2 Morse taper socket or Morse taper shank drills, from 15-16 to 1 $\frac{1}{4}$ inches, inclusive,	20.00
No. 4.	17 inch handle, taking No. 3 Morse taper socket or Morse taper shank drills, from 1 9-32 to 2 inches, inclusive,	25.00
Socket No. 1,	for taper shank drills from $\frac{1}{4}$ to 19-32 inches, inclusive,	1.50
Socket No. 2,	for taper shank drills from $\frac{5}{8}$ to 29-32 inches, inclusive,	2.00
Socket No. 3,	for taper shank drills from 15-16 to 1 $\frac{1}{4}$ inches, inclusive,	2.50
No. 3.	Flat drill socket for No. 2 Packer Ratchet and fitting No. 2 taper socket,	1.75
No. 4.	Flat drill socket for No. 3 Packer Ratchet and fitting No. 3 taper socket,	-
No. 5.	Flat drill socket for No. 4 Ratchet,	-

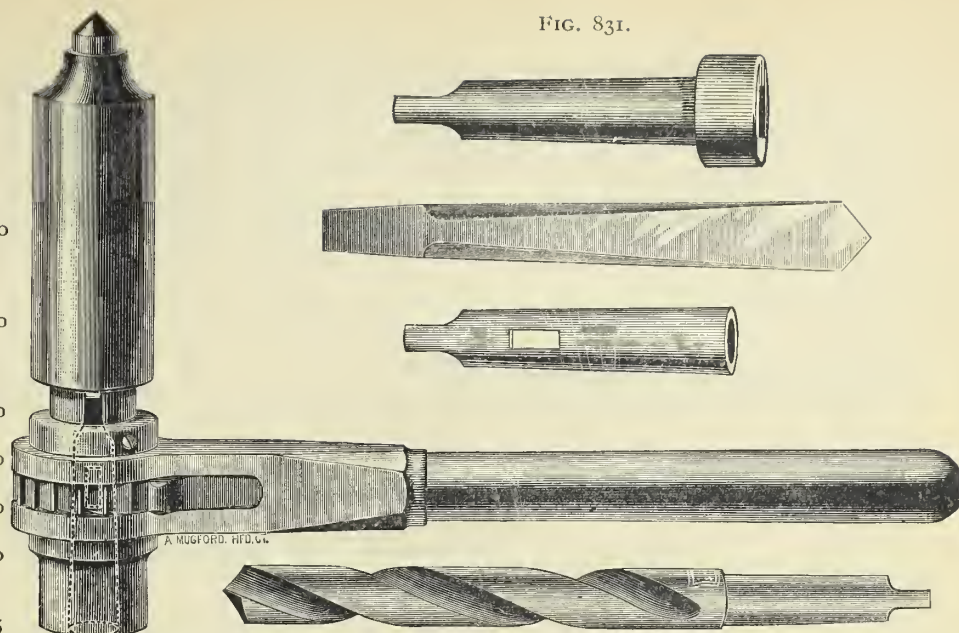


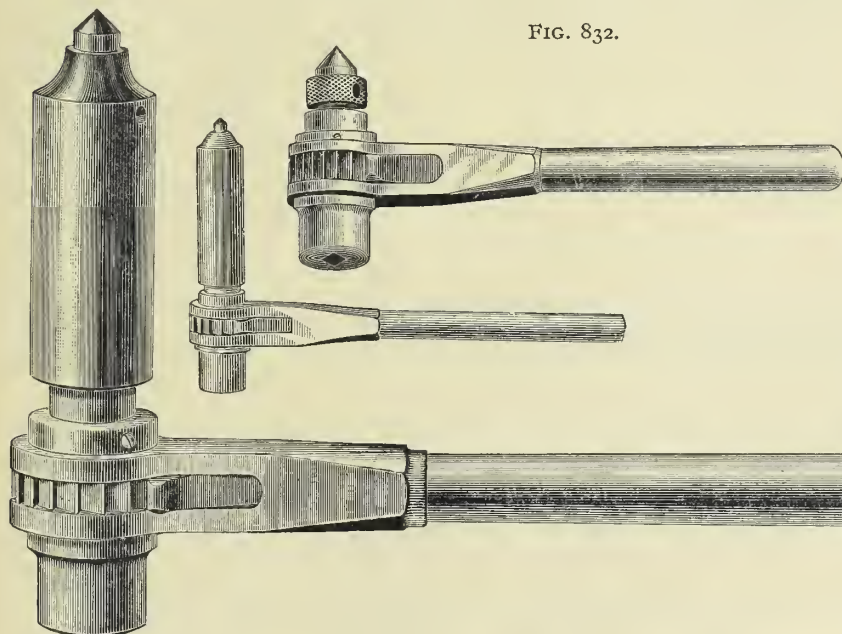
FIG. 831.

No. 2 Packer Ratchet with No. 1 taper socket will take taper shank drills from $\frac{1}{4}$ to 29-32 inches, inclusive.
 No. 3 Packer Ratchet with Nos. 1 and 2 taper sockets will take taper shank drills from $\frac{1}{4}$ to 1 $\frac{1}{4}$ inches, inclusive.
 No. 4 Packer Ratchet with Nos. 1, 2 and 3 taper sockets will take taper shank drills from $\frac{1}{4}$ to 2 inches, inclusive.

FIG. 832.

GENUINE PACKER RATCHET DRILLS.

FOR FLAT DRILLS ONLY.



PACKER RATCHET.

No. 1.	10 inch handles,	-	-	-	\$10.50
No. 2.	12 inch handles,	-	-	-	13.50
No. 3.	15 inch handles,	-	-	-	16.00
No. 4.	17 inch handles,	-	-	-	19.00
No. 5.	20 inch handles,	-	-	-	23.00

BOILER RATCHETS.

No. 1.	10 inch handles,	-	-	-	\$9.00
No. 2.	12 inch handles,	-	-	-	10.50

AUGER RATCHETS.

No. 1,	-	-	-	-	\$7.00
No. 2,	-	-	-	-	8.00
Sockets,	-	-	-	-	3.00
Screw,	-	-	-	-	3.00

FIG. 833.



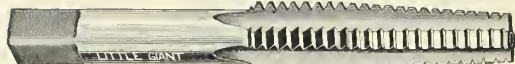
FLAT DRILLS.

FOR PACKER RATCHETS.

Size,	-	-	$\frac{3}{8}$ inch	$\frac{1}{2}$ inch	$\frac{5}{8}$ inch	$\frac{3}{4}$ inch	$\frac{7}{8}$ inch	1 inch	1 $\frac{1}{8}$ inches	1 $\frac{1}{4}$ inches	1 $\frac{1}{2}$ inches	1 $\frac{3}{4}$ inches	6 inches long
Price,	-	-	.40	.40	.40	.45	.45	.45	.50	.55	.60	.65	cent each

PRENTISS TOOL & SUPPLY CO.

FIG. 834.



TAPER.

FIG. 835.



PLUG.

FIG. 836.



BOTTOMING.

No. 131.

SETS OF MACHINISTS' HAND TAPS.

Three taps to set, taper, plug and bottoming.

Diameter.	Number of Threads to Inch.	Price, Each.	Price, per Set.	Diameter.	Number of Threads per Inch.	Price, Each.	Price, per Set.
1-4 inch	16, 18, 20	\$0.45	\$1.35	15-16 inch	9	\$1.80	\$5.40
5-16 inch	16, 18	.50	1.50	1 inch	8	2.00	6.00
3-8 inch	14, 16, 18	.55	1.65	1 1-8 inch	7, 8	2.25	6.75
7-16 inch	14, 16	.60	1.80	1 1-4 inch	7	2.60	7.80
1-2 inch	12, 13, 14	.70	2.10	1 3-8 inch	6	3.00	9.00
9-16 inch	12, 14	.80	2.40	1 1-2 inch	6	3.50	10.50
5-8 inch	10, 11, 12	.90	2.70	1 5-8 inch	5, 5 1-2	4.20	12.60
11-16 inch	11, 12	1.05	3.15	1 3-4 inch	5	5.00	15.00
3-4 inch	10, 12	1.20	3.60	1 7-8 inch	4 1-2, 5	3.80	17.40
13-16 inch	10	1.40	4.20	2 inch	4 1-2	6.70	20.10
7-8 inch	9, 10	1.60	4.80				

Unless advised to the contrary we fill orders with the V threads. Please state number of threads and exact size wanted.

FIG. 837.



No. 131 A.

MACHINE OR NUT TAPS.

Diameter.	Length.	Number of Threads to Inch.	Price, Each.	Diameter.	Length.	Number of Threads to Inch.	Price, Each.
3-16 inch	4 inches	24	\$0.60	1 3-4 inches	15 1-2 inches	5	\$6.00
1-4 inch	4 1-2 inches	18, 20, 24	.60	1 7-8 inches	16 1-4 inches	4 1-2, 5	6.80
5-16 inch	5 1-8 inches	16, 18	.70	2 inches	17 inches	4 1-2, 5	7.70
3-8 inch	5 3-4 inches	14, 16, 18	.80	2 1-8 inches	18 inches	4 1-2	9.00
7-16 inch	6 3-8 inches	12, 14, 16	.90	2 1-4 inches	18 inches	4 1-2	10.20
1-2 inch	7 inches	12, 13, 14	1.00	2 3-8 inches	19 inches	4 1-2	11.50
9-16 inch	7 3-4 inches	10, 11, 12	1.15	2 1-2 inches	19 inches	4	12.50
5-8 inch	8 1-2 inches	10, 11, 12	1.30	2 5-8 inches	19 1-2 inches	4	14.00
11-16 inch	9 1-4 inches	10, 11, 12	1.45	2 3-4 inches	19 1-2 inches	4	15.00
3-4 inch	9 1-4 inches	10, 11, 12	1.60	2 7-8 inches	21 inches	4	16.50
13-16 inch	10 inches	10	1.80	3 inches	21 inches	3 1-2	18.00
7-8 inch	10 inches	9, 10, 12	2.10	3 1-8 inches	21 inches	3 1-2	19.75
15-16 inch	11 inches	9	2.40	3 1-4 inches	21 inches	3 1-2	21.50
1 inch	11 inches	8, 9	2.80	3 3-8 inches	21 inches	3 1-2	23.00
1 1-8 inch	13 inches	7, 8	3.20	3 1-2 inches	21 inches	3 1-4	25.00
1 1-4 inch	13 inches	7	3.70	3 5-8 inches	21 inches	3 1-4	27.00
1 3-8 inch	14 inches	6	4.20	3 3-4 inches	21 inches	3	29.50
1 1-2 inch	14 inches	6	4.70	3 7-8 inches	21 inches	3	31.00
1 5-8 inch	14 3-4 inches	5, 5 1-2	5.30	4 inches	21 inches	3	33.50

Unless advised to the contrary, we fill orders with V threads. We keep in stock the above, and 1-32 over size for rough iron.

FIG. 838.



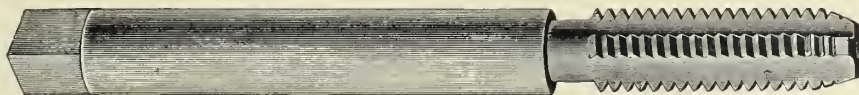
MACHINE SCREW TAPS.

No. of Screw Gauge.	Approximate Size.	Standard No. of Threads to Inch.	Threads also Furnished.	Price Each.	Price Per Doz.
2	5-64 inch	56 inches	48 and 64 inches	\$0 35	\$4 00
3		48 inches	40 and 56 inches	35	4 00
4	7-64 inch	36 inches	32 and 40 inches	35	4 00
5		36 inches	30, 32 and 40 inches	35	4 00
6	9-64 inch	32 inches	30, 36 and 40 inches	35	4 00
7		32 inches	28 and 30 inches	35	4 00
8	5-32 inch	32 inches	24 and 30 inches	35	4 00
9		30 inches	24, 28 and 32 inches	35	4 00
10	3-16 inch	24 inches	28, 30 and 32 inches	35	4 00
11		24 inches	28 and 30 inches	35	4 00
12	7-32 inch	24 inches	20, 22 and 28 inches	35	4 00
13		22 inches	20 and 24 inches	38	4 40
14	¼ inch	20 inches	22 and 24 inches	38	4 40
15		20 inches	18, 22 and 24 inches	38	4 40
16	17-64 inch	18 inches	16, 20 and 24 inches	38	4 40
17		18 inches	16 and 20 inches	38	4 40
18	9-32 inch	18 inches	16 and 20 inches	38	4 40
19		18 inches	16 and 20 inches	38	4 40
20	5-16 inch	16 inches	18 and 20 inches	45	5 30
22		16 inches	18 inches	45	5 30
24	¾ inch	16 inches	14 and 18 inches	45	5 30
26		16 inches	14 inches	53	6 30
28		14 inches	16 inches	53	6 30
30	7-16 inch	14 inches	16 inches	53	6 30

Less than six taps of a size and thread will be charged as single taps.

Sizes and threads not on list will be considered special, and will be subject to special prices.

FIG. 839.



PULLEY TAPS.

Diameter.	No. of Threads to Inch.	PRICE EACH.									
		6 Inch.	8 Inch.	10 Inch.	12 Inch.	14 Inch.	16 Inch.	18 Inch.	20 Inch.	22 Inch.	24 Inch.
¼ inch	20 inches	\$0 65	\$0 70	\$0 80	\$0 90						
5-16 inch	18 inches	75	80	1 00	1 20						
¾ inch	16 inches	80	90	1 10	1 30	\$1 40	\$1 60	\$1 80			
7-16 inch	14 inches	90	1 00	1 20	1 40	1 60	1 70	1 90			
½ inch	12, 13 inches	1 00	1 30	1 40	1 50	1 60	1 80	2 00	\$2 20		
9-16 inch	12 inches	1 15	1 35	1 45	1 55	1 70	1 85	2 10	2 30	\$2 50	
5/8 inch	11 inches	1 20	1 40	1 50	1 60	1 75	1 90	2 20	2 40	2 60	\$2 80
11-16 inch	11 inches	1 30	1 50	1 55	1 70	2 00	2 10	2 30	2 50	2 70	2 90
¾ inch	10 inches	1 40	1 50	1 60	1 80	2 10	2 30	2 50	2 70	2 90	3 10
13-16 inch	10 inches	1 60	1 75	1 80	2 00	2 30	2 50	2 70	2 90	3 10	3 30
7/8 inch	9 inches	1 80	2 00	2 10	2 30	2 50	2 70	2 90	3 10	3 30	3 50
15-16 inch	9 inches	2 00	2 30	2 40	2 55	2 70	2 90	3 10	3 30	3 50	3 70
1 inch	8 inches	2 50	2 70	2 80	3 00	3 20	3 40	3 60	3 80	4 00	4 20

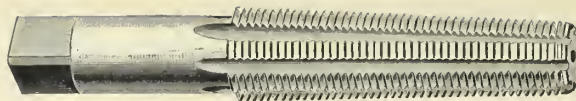
Special sizes and threads furnished at special prices.

TAPPER TAPS.

Diameter.	No. of Threads to Inch.	Length of Thread in Inches.	PRICE EACH.				WHOLE LENGTH	
			11 Inches.	12 Inches.	14 Inches.	15 Inches.		
1 inch	20 inches	1¼ inches	\$ 70	\$0 75	\$0 80	\$0 90		
5-16 inch	18 inches	2 inches	80	85	90	1 00		
¾ inch	16 inches	2 inches	90	95	1 00	1 10		
7-16 inch	14 inches	2¼ inches	1 00	1 05	1 15	1 25		
½ inch	12 and 13 inches	2½ inches	1 12	1 15	1 25	1 35		
9-16 inch	12 inches	2½ inches	1 30	1 35	1 45	1 55		
5/8 inch	11 inches	2½ inches	1 45	1 50	1 65	1 75		
11-16 inch	11 inches	2½ inches	1 62	1 70	1 80	1 95		
¾ inch	10 inches	2½ inches	1 80	1 85	2 00	2 10		
13-16 inch	10 inches	2½ inches	2 05	2 10	2 25	2 35		
7/8 inch	9 inches	3 inches	2 35	2 45	2 60	2 75		
15-16 inch	9 inches	3 inches	2 70	2 75	3 00	3 15		
1 inch	8 inches	3¼ inches	3 15	3 20	3 50	3 65		
1½ inches	7 inches	3½ inches	3 60	3 70	3 95	4 10		
1¼ inches	7 inches	3½ inches	4 15	4 25	4 50	4 65		
1⅝ inches	6 inches	4 inches	4 70	4 80	5 05	5 20		
1⅞ inches	6 inches	4 inches	5 30	5 40	5 65	5 80		

Prices on special length taps given on application.

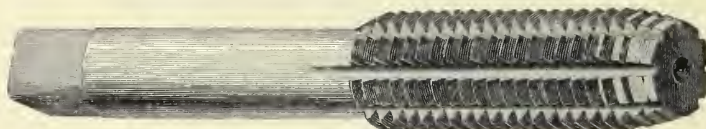
FIG. 840.

**HOB OR MASTER'S TAPS.**

Diameter, inches, - - - -	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$
Standard No. of threads to inch,	20	18	16	14	12	12	11	11	10	10	9
Threads also furnished, - -	16	16	14	16	13		10	12			
Length over all, - - - -	4	4 $\frac{3}{4}$	5 $\frac{1}{2}$	6 $\frac{1}{8}$	6 $\frac{1}{2}$	6 $\frac{7}{8}$	7 $\frac{1}{4}$	7 $\frac{3}{8}$	8	8 $\frac{1}{4}$	8 $\frac{1}{2}$
Price, each, - - - -	\$0.75	.87	1.00	1.12	1.25	1.44	1.62	1.81	2.00	2.25	2.62
Diameter, inches, - - - -		$\frac{15}{16}$	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{7}{8}$	2
Standard No. of threads to inch,		9	8	7	7	6	6	5	5	4 $\frac{1}{2}$	4 $\frac{1}{2}$
Threads also furnished, - -				8	8			5 $\frac{1}{2}$		5	
Length over all, - - - -		8 $\frac{3}{8}$	9 $\frac{1}{4}$	9 $\frac{3}{8}$	10	10 $\frac{3}{8}$	10 $\frac{3}{4}$	11 $\frac{1}{8}$	11 $\frac{1}{2}$	11 $\frac{7}{8}$	12 $\frac{1}{4}$
Price, each, - - - -		\$3.00	3.50	4.00	4.62	5.25	5.87	6.62	7.50	8.50	9.62

These long Hob Taps are mostly used for cutting solid bolt dies. Master's Taps are sent even size, unless over size is called for.

FIG. 841.

**SHORT HOB TAPS.**

Diameter, inches, - - - -	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$
Standard No. of threads to inch,	20	18	16	14	12	12	11	11	10	10	9
Threads also furnished, - -	16	16	14	16	13		10	12			
Length over all, - - - -	2 $\frac{3}{4}$	3 $\frac{3}{8}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4	4 $\frac{1}{4}$	4 $\frac{1}{2}$	4 $\frac{3}{4}$	5	5 $\frac{1}{4}$	5 $\frac{1}{2}$
Price, each, - - - -	\$0.60	.70	.80	.90	1.00	1.15	1.30	1.45	1.60	1.80	2.10
Diameter, inches, - - - -		$\frac{15}{16}$	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{7}{8}$	2
Standard No. of threads to inch,		9	8	7	7	6	6	5	5	4 $\frac{1}{2}$	4 $\frac{1}{2}$
Threads also furnished, - -				8	8			5 $\frac{1}{2}$		5	
Length over all, - - - -		5 $\frac{3}{4}$	6	6 $\frac{1}{4}$	6 $\frac{3}{4}$	7	7 $\frac{1}{4}$	8	8 $\frac{1}{2}$	9	9 $\frac{1}{2}$
Price, each, - - - -		\$2.40	2.80	3.20	3.70	4.20	4.70	5.30	6.00	6.80	7.70

We send these Hob Taps exactly as ordered, even size, unless over size is specified.

When these Hobs are desired over size for cutting open dies, the allowance must be made on the order.

FIG. 842.

**SELLER'S HOB TAPS.**

United States Standard No.				United States Standard No.				United States Standard No.			
Diameter, Inches.	No. of Threads to Inch.	Length over all.	Price, Each.	Diameter, Inches.	No. of Threads to Inch.	Length over all.	Price, Each.	Diameter, Inches.	No. of Threads to Inch.	Length over all.	Price, Each.
$\frac{1}{4}$	20	4 $\frac{1}{4}$	\$0.90	$\frac{11}{16}$	11	7	\$2.20	1 $\frac{1}{4}$	7	10	\$5.55
$\frac{5}{16}$	18	4 $\frac{1}{2}$	1.05	$\frac{3}{4}$	10	7 $\frac{1}{2}$	2.40	1 $\frac{3}{8}$	6	10 $\frac{1}{2}$	6.30
$\frac{3}{8}$	16	5	1.20	$\frac{13}{16}$	10	8	2.70	1 $\frac{1}{2}$	6	11	7.05
$\frac{7}{16}$	14	5 $\frac{1}{4}$	1.35	$\frac{1}{2}$	9	8 $\frac{1}{2}$	3.15	1 $\frac{5}{8}$	5 $\frac{1}{2}$	11 $\frac{1}{2}$	7.95
$\frac{1}{2}$	13	5 $\frac{3}{4}$	1.50	$\frac{15}{16}$	9	9	3.60	1 $\frac{3}{4}$	5	12	9.00
$\frac{9}{16}$	12	6	1.75	1	8	9 $\frac{1}{2}$	4.20	1 $\frac{7}{8}$	5	12 $\frac{1}{2}$	10.20
$\frac{5}{8}$	11	6 $\frac{1}{2}$	1.95	1 $\frac{1}{8}$	7	9 $\frac{3}{4}$	4.80	2	4 $\frac{1}{2}$	13	11.55

Unless otherwise advised, we fill orders for Seller's Hob Taps with taps having "United States Standard Threads."

FIG. 843.

**BIT-BRACE TAPS.**

Diameter, Inches.	No. of Threads to Inch.	Price, Each.	Diameter, Inches.	No. of Threads to Inch.	Price, Each.
$\frac{3}{16}$	24	\$0.50	$\frac{3}{8}$	16	\$0.60
$\frac{1}{4}$	20	.50	$\frac{7}{16}$	14	.70
$\frac{5}{16}$	18	.55	12 and 13		.80

All Bit-Brace Taps are sent even size unless over size is called for on the order.

FIG. 844.

STAY BOLT TAPS.

Lengths.	DIAMETER, INCHES.					
	$\frac{3}{4}$, 13-16, $\frac{7}{8}$	15-16, 1.	1 1-16, 1 $\frac{1}{8}$.	1 3-16, 1 $\frac{1}{4}$.	1 5-16, 1 $\frac{3}{8}$.	1 7-16, 1 $\frac{1}{2}$.
	Price.	Price.	Price.	Price.	Price.	Price.
12 inches	\$4 50					
14 inches	5 00					
16 inches	5 60	\$6 60	\$7 60	\$9 00	\$11 00	\$13 00
18 inches	7 20	8 50	9 50	10 50	12 50	14 50
21 inches	8 00	9 35	10 35	12 00	14 00	16 00
24 inches	8 80	10 20	11 20	12 75	15 00	17 00
27 inches	10 90	12 25	13 25	14 75	17 00	19 00
30 inches	13 00	14 25	15 25	16 50	18 50	20 00
33 inches	14 00	15 40	16 40	18 00	20 00	22 00
36 inches	15 00	16 50	17 50	19 50	21 50	23 50
39 inches	16 50	18 15	20 00	22 00	24 00	26 00
42 inches	18 00	19 75	22 00	24 00	26 00	28 00
48 inches	19 00	21 00	23 50	25 50	28 00	30 00
54 inches	20 00	22 25	25 00	27 00	30 00	32 00

In ordinary Stay Bolt Taps, state diameter and number of threads to the inch; also, length of parts A, B, C, D, and E.

All orders for Stay Bolt Taps will be filled with taps cutting twelve threads to the inch, unless a different thread is specified.

Blank order slips furnished on application.

FIG. 845.

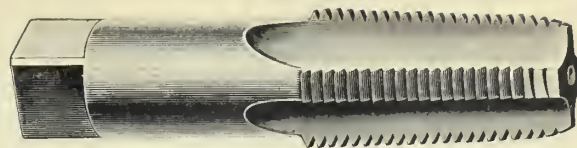
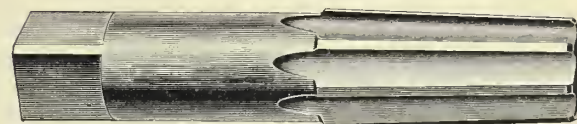


FIG. 846.



FIG. 847.

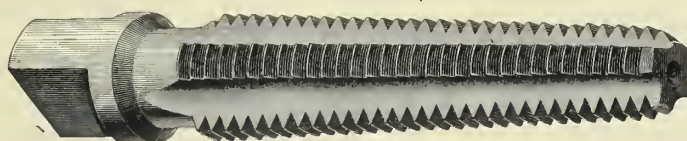


PIPE TAPS, HOBS AND REAMERS.

Diameter.	Price.	Diameter.	Price.	Diameter.	Price.
$\frac{1}{8}$ inch	\$1 12	1 inch	\$3 12	2 $\frac{1}{2}$ inches	\$10 50
$\frac{1}{4}$ inch	1 25	1 $\frac{1}{4}$ inches	3 75	3 inches	15 00
$\frac{3}{8}$ inch	1 50	1 $\frac{1}{2}$ inches	4 62	3 $\frac{1}{2}$ inches	22 00
$\frac{1}{2}$ inch	1 87	2 inches	6 25	4 inches	33 00
$\frac{3}{4}$ inch	2 50				

All Pipe Taps are sent with right hand threads, unless left hand is specified on order.

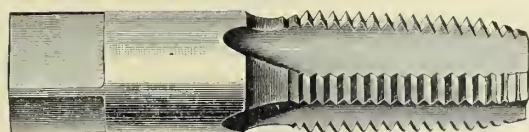
FIG. 848.



BLACKSMITHS' TAPER TAPS.

Diameter.	No. of Threads to Inch.	Price Each.	Diameter.	No. of Threads to Inch.	Price Each.
$\frac{1}{4}$ inch	18, 20 and 24 inches	\$0 30	$\frac{3}{4}$ inch	10 and 12 inches	\$0 65
5-16 inch	16, 18 and 20 inches	30	$\frac{7}{8}$ inch	9 and 10 inches	90
$\frac{3}{8}$ inch	14, 16 and 18 inches	35	1 inch	8 inches	1 25
7-16 inch	14, 16 and 18 inches	40	1 $\frac{1}{8}$ inches	7 and 8 inches	1 50
$\frac{1}{2}$ inch	12, 14 and 16 inches	40	1 $\frac{1}{4}$ inches	7 and 8 inches	1 75
9-16 inch	12 and 14 inches	50	1 $\frac{1}{2}$ inches	6 inches	3 00
$\frac{5}{8}$ inch	10, 11 and 12 inches	50			

FIG. 849.



PATCH BOLT TAPS.

Diameter.	No. of Threads to Inch.	Price Each.	Diameter.	No. of Threads to Inch.	Price Each.
$\frac{1}{2}$ inch	12 inches	\$0 70	13-16 inch	12 inches	\$1 40
9-16 inch	12 inches	80	$\frac{7}{8}$ inch	12 inches	1 60
$\frac{3}{8}$ inch	12 inches	90	15-16 inch	12 inches	1 80
11-16 inch	12 inches	1 05	1 inch	12 inches	2 00
$\frac{3}{4}$ inch	12 inches	1 20			

These taps are made especially for boiler makers. They are slightly tapered, for the purpose of making the bolt a steam tight fit.

FIG. 850.



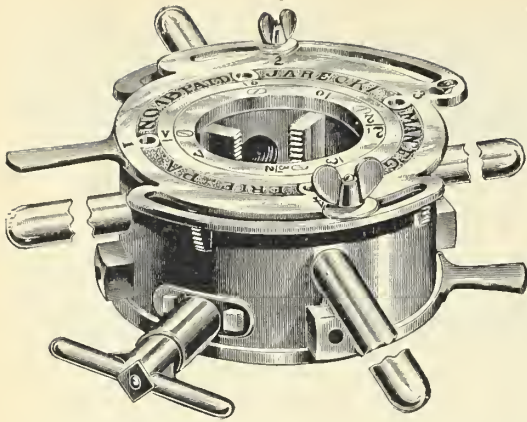
STOVE BOLT TAPS.

Diameter	No. of Threads to Inch.	Price Each.	Diameter	No. of Threads to Inch.	Price Each.
5-32 inch	28 inches	\$0 35	3-16 inch	24 inches	35
3-16 inch	22 inches	35	7-32 inch	18 inches	38
$\frac{1}{4}$ inch	18 inches	38	5-16 inch	18 inches	38
$\frac{3}{8}$ inch	16 inches	45			

Sizes and threads not on the above list will be charged at special prices.

Less than six taps of a size will be charged as single taps.

FIG. 851.



PATENT SCREW PLATE AND PIPE CUTTER.

No. 1	threads and cuts	$\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$	-	-	\$14.00	Weight, boxed, 12 pounds
" 2	"	"	$\frac{1}{2}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$	-	16.00	" " 24 "
" 3	"	"	1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 2	-	20.00	" " 32 "
" 3 $\frac{1}{2}$	"	"	$\frac{1}{2}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 2	-	22.50	" " 34 "
" 4A	"	"	1 $\frac{1}{2}$, 2, 2 $\frac{1}{2}$, 3	-	35.00	" " 84 "
" 4B	"	"	2 $\frac{1}{2}$, 3, 3 $\frac{1}{2}$, 4	-	50.00	" " 88 "
" 5	"	"	4 $\frac{1}{2}$, 5, 6	-	75.00	" " 108 "
" 5 $\frac{1}{2}$	"	"	6, 7, 8	-	125.00	

Number,	-	-	-	-	1	2	3	3 $\frac{1}{2}$	4A	4B	5	5 $\frac{1}{2}$
Dies, per set, right or left hand,	-	\$2.00	2.00	2.00	2.00	2.00	2.00	2 sets 4.00	3.00	3.00	6.00	6.00
Knives,	-	-	-	-	.40	.40	.40	.40	.50	.50	.75	.75

The Nos. 1, 2, 3 and 3 $\frac{1}{2}$ have two handles. Nos. 4A and 4B have four handles. Nos. 5 and 5 $\frac{1}{2}$ have 5 handles.

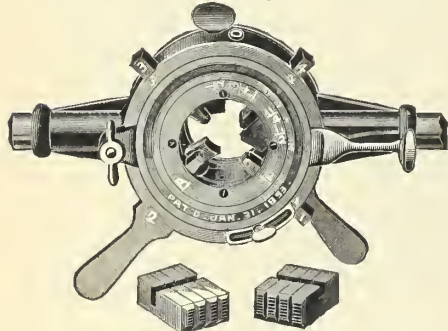
Can furnish extra dies for casing and line pipe, also for English and Whitworth standard threads.

RATCHET SCREW PLATE WITH LEADER SCREW.

A very valuable tool for threading pipe in corners and ditches.

No. 3	Ratchet Screw Plate, 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 2 inch,	-	-	-	-	\$20.00
" 4B	" " " 2 $\frac{1}{2}$, 3, 3 $\frac{1}{2}$, 4 inch,	-	-	-	-	60.00
" 5	" " " 4 $\frac{1}{2}$, 5, 6 inches,	-	-	-	-	90.00
Extra dies for No. 3, per set,	-	\$2.00	Shipping weight, boxed, 43 pounds			
" " " No. 4B, "	-	3.00	" " " 119 "			
" " " No. 5, "	-	6.00				

FIG. 853.



No. 0,	-	-	-	\$1.25
No. 1,	-	-	-	1.50
No. 1 $\frac{1}{2}$,	-	-	-	1.50

PRICE OF EXTRA DIES, PER SET (FOUR PIECES), RIGHT OR LEFT HAND.

No. 2,	-	-	-	\$1.75
No. 3,	-	-	-	2.00
No. 4,	-	-	-	2.00

RATCHET STOCKS.

SIZES OF PIPES EACH TOOL WILL THREAD AND CUT.

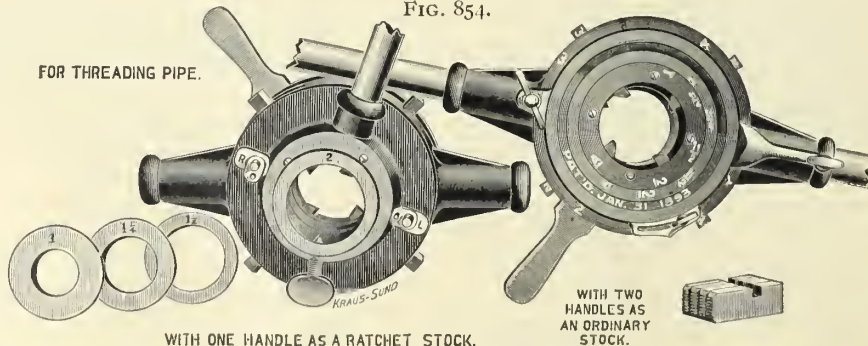
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$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$
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$\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$
1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 2
$\frac{1}{2}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 2
$\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 2
1 $\frac{1}{2}$, 2, 2 $\frac{1}{2}$, 3
2 $\frac{1}{2}$, 3, 3 $\frac{1}{2}$, 4
1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 2
2 $\frac{1}{2}$, 3, 3 $\frac{1}{2}$, 4

Without Cut-Off.	With Cut Off.
\$12.00	\$15.00
13.00	16.00
14.00	17.00
17.00	20.00
22.00	25.00
25.00	28.00
28.00	31.00
40.00	45.00
55.00	60.00
25.00	28.00
60.00	65.00

EXTRA CUT-OFF BLADES.

Nos. 0 to 4, 30c. each; Nos. 4 $\frac{1}{2}$ to 6, 40c. each; Nos. 0 to 2 have pipe handles; Nos. 3 to 8 have solid steel handles. No. 7 can be fitted to thread $\frac{1}{2}$ and $\frac{3}{4}$ inch by adding \$3.00 for one set extra dies and two bushings.

FIG. 854.



RATCHET DIE STOCKS.

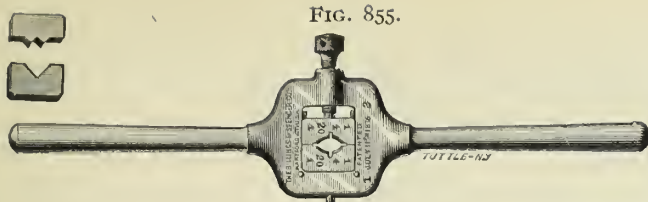


FIG. 855.

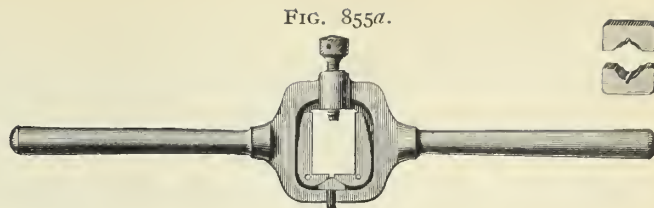


FIG. 855a.

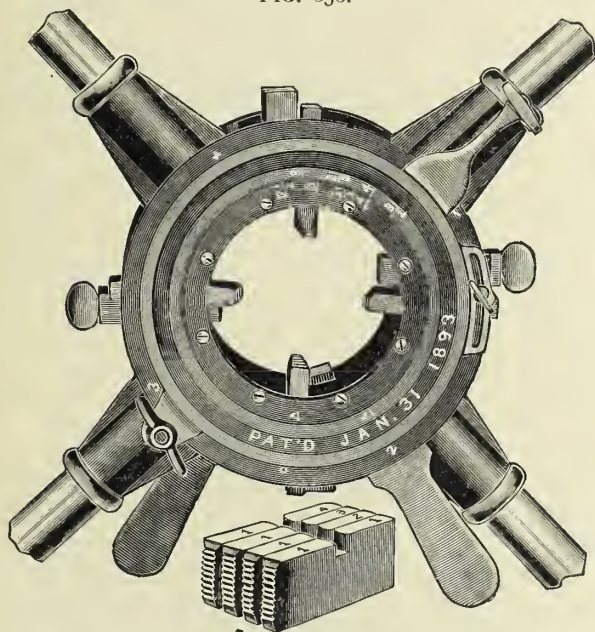
PATENT SCREW PLATES.

PRICE OF PLATES WITHOUT DIES.

No. 0. Entire length, $6\frac{3}{4}$ inches,	-	-	-	-	\$2.00
No. 1. Entire length, 15 inches,	-	-	-	-	3.25
No. 2. Entire length, 23 inches,	-	-	-	-	5.00
No. 3. Entire length, $30\frac{1}{2}$ inches,	-	-	-	-	6.50
No. 4. Entire length, 41 inches,	-	-	-	-	16.00
No. 0. Plate, length $6\frac{3}{4}$ inches, with dies and taps, cutting $\frac{1}{8}$, 48; $\frac{5}{16}$, 40; $\frac{3}{8}$, 32; $\frac{7}{8}$, 24; $\frac{1}{4}$, 20,	-	-	-	-	5.25
The same, nickel-plated, in leather-covered cases, lined with plush,	-	-	-	-	6.50
Single pair dies, each,	-	-	-	-	.50
Single pair dies, holding 5 sizes taps,	-	-	-	-	.50
Blank dies for No. 0 plate,	-	-	-	-	.37½
No. 0 plate with 5 dies, length, $6\frac{3}{4}$ inches,	-	-	-	-	4.00
No. 1, with 5 pairs dies, cutting $\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16; $\frac{7}{8}$, 14; $\frac{1}{2}$, 13,	-	-	-	-	7.00
No. 1, with 5 pairs dies, cutting as above, and 5 taper taps, Single pair dies in stock to fit No. 1 plate, from $\frac{1}{16}$ ths to $\frac{3}{8}$ ths by 16ths,	-	-	-	-	9.00
Blank dies for No. 1 plate, per pair,	-	-	-	-	1.00
	-	-	-	-	.75

No. 2, with 5 pairs dies, cutting $\frac{1}{2}$, 12; $\frac{5}{16}$, 12; $\frac{3}{8}$, 11; $\frac{1}{2}$, 11; $\frac{3}{4}$, 10,	-	-	-	-	\$10.00
No. 2, with 5 pairs dies, cutting as above, and 5 taper taps, Single pair dies in stock to fit No. 2 plate, from $\frac{1}{4}$ to 1 inch by 16ths,	-	-	-	-	13.50
Blank dies for No. 2 plate, per pair,	-	-	-	-	1.50
No. 3, with 5 pairs dies, cutting $\frac{1}{2}$, 10; $\frac{3}{8}$, 9; $\frac{1}{2}$, 9; 1, 8; $1\frac{1}{8}$, 7,	-	-	-	-	1.12
No. 3, with 5 pairs dies, cutting as above, and 5 taper taps, Single pair dies in stock for No. 3 plate, from $\frac{1}{2}$ to 1 inch by 16ths; 1 to $1\frac{1}{2}$ inches by 8ths,	-	-	-	-	15.00
Blank dies for No. 3 plate, per pair,	-	-	-	-	22.00
No. 4, with 6 pairs dies, cutting $1\frac{3}{8}$, 6; $1\frac{1}{2}$, 6; $1\frac{5}{8}$, 5; $1\frac{3}{4}$, 5; $1\frac{7}{8}$, $4\frac{1}{2}$; 2, $4\frac{1}{2}$,	-	-	-	-	2.00
Single pair dies, for No. 4 plate,	-	-	-	-	1.50
No. 0 plates put up in paper cases; Nos. 1, 2, 3 and 4 put up in wooden cases.	-	-	-	-	33.00
	-	-	-	-	3.00

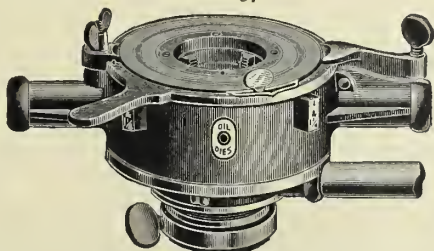
FIG. 856.



THE OSTER ADJUSTABLE RATCHET DIE STOCKS.

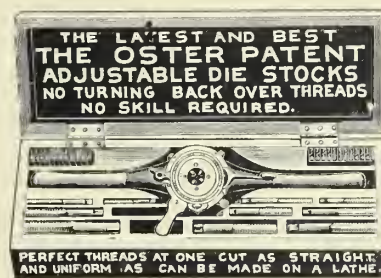
This cut represents Nos. 5 and 6 with cut-off blades in each side, which makes them practically as quick as wheel cutters. Have solid steel handles.

FIG. 857.



THE OSTER ADJUSTABLE RATCHET DIE STOCKS.

FIG. 858.



MACHINISTS' TOOLS.

Machinists' and Model Makers' tools are all graduated and and gauged on the dial to standard sizes.

No. 21.—8 SIZES.

In shipping case only, with 7 sets of dies to thread the following sizes of bolt:

$\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16; $\frac{7}{8}$, 14; $\frac{1}{2}$ and $\frac{3}{16}$, 12; $\frac{5}{8}$, 11; $\frac{3}{4}$, 10,	\$13.00
Same, with taps,	18.00
In finished oak case, with 8 taps and 7 sets of dies	20.00
Extra dies, per single set (4 pieces),	1.25

No. 22.

In shipping case only, 10 sizes, 9 sets dies, without taps:

$\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16; $\frac{7}{8}$, 14; $\frac{1}{2}$ and $\frac{3}{16}$, 12; $\frac{5}{8}$, 11; $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8,	\$22.00
Same, with taps,	28.00
Same, in finished oak case, with 10 taps and 9 sets dies,	30.00
Extra dies, per single set (4 pieces),	1.50

Will send above sets standard sizes, V thread, unless otherwise ordered.

FIG. 859.

**MACHINISTS' SCREW PLATES.**

- No. 2½**
11½ inches long, 3 pair dies and 3 taps; cutting ¼, 20; ⅜, 16; ½, 12. Each, \$5.00.
- No. 2½ A**
11½ inches long, 3 pair dies and 3 taps; cutting ¼, 20; ⅝, 18; ⅜, 16. Each, \$4.80.
- No. 2½ C**
11½ inches long, 5 pair dies and 5 taps; cutting ¼, 20; ⅝, 18; ⅜, 16; ⅞, 14; ½, 12. Each, \$7.50.
- No. 3**
14 inches long, 3 pair dies and 3 taps; cutting ⅜, 16; ⅞, 14; ½, 12. Each, \$5.50.
- No. 3½ B**
14 inches long, 3 pair dies and 3 taps; cutting ⅞, 14; ½, 12; ⅝, 11. Each, \$5.90.
- No. 3 D**
14 inches long, 6 pair dies and 6 taps; cutting ¼, 20; ⅝, 18; ⅜, 16; ⅞, 14; ½, 12; ⅝, 11. Each, \$9.60.
- No. 4 A**
19 inches long, 3 pair dies and 3 taps; cutting ½, 12; ⅝, 11; ¾, 10. Each, \$6.90.
- Machinists' Taper Hand Taps are sent with the above plates.

BLACKSMITHS' SCREW PLATES.

- No. 2½ D**
11½ inches long, 3 pair dies and 3 taps; cutting ¼, 20; ⅝, 18; ⅜, 16. Each, \$4.65.
- No. 2½ F**
11½ inches long, 5 pair dies and 5 taps; cutting ¼, 20; ⅝, 18; ⅜, 16; ⅞, 14; ½, 12. Each, \$6.85.
- No. 4**
19 inches long, 3 pair dies and 4 taps; cutting ⅜, 16; ½, 12; ⅝, 12; ¾, 10. Each, \$6.00.
- No. 7**
27 inches long, 3 pair dies and 4 taps; cutting ½, 12; ⅝, 12; ¾, 10; 1, 8. Each, \$8.25.
- No. 8**
30 inches long, 3 pair dies and 6 taps; cutting ¾, 10; ⅞, 10; ⅞, 9; 1, 9; 1½, 8; 1¼, 8. Each, \$10.50.

FIG. 860.

**MACHINISTS' SCREW PLATES.**

- No. 00**
6 inches long, 4 pair dies and 4 taps; cutting 2, 64; 3, 56; 4, 48; 6, 40. Each, \$2.50.
- No. 00 A**
6 inches long, 3 pair dies and 4 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24. Each, \$2.50.
- No. 00 M**
6 inches long, 4 pair dies and 4 taps; cutting ⅞, 64; ⅞, 56; ⅞, 48; ⅞, 40. Each, \$2.50.
- No. 00 N**
6 inches long, 3 pair dies and 4 taps; cutting ⅞, 36; ⅞, 32; ⅞, 32; ⅞, 24. Each, \$2.50.

No. 0

7½ inches long, 4 pair dies and 4 taps; cutting 4, 48; 6, 40; 10, 32; 14, 24. Each, \$3.00.

No. 0 A

7½ inches long, 3 pair dies and 4 taps; cutting 10, 24; 12, 24; 14, 20; 16, 18. Each, \$3.25.

These plates are furnished with plug machine screw taps.

FIG. 861.



No. 1

7½ inches long, 3 pair dies and 6 taps; cutting 4, 40; 6, 40; 4, 36; 6, 36; 8, 32; 10, 32. Each, \$4.50.

No. 2

8½ inches long, 3 pair dies and 6 taps; cutting 6, 32; 8, 32; 10, 24; 12, 24; 14, 20; 16, 20. Each, \$4.50.

These plates are furnished with plug machine screw taps.

FIG. 862.



No. 1½

9 inches long, 4 pair dies and 4 taps; cutting 6, 32; 8, 30; 10, 24; 14, 20. Each, \$3.25.

No. 1½ A

9 inches long, 3 pair dies and 4 taps; cutting 14, 20; 16, 18; 18, 18; 20, 16. Each, \$3.40.

THE STANDARD SCREW PLATE.

FIG. 863.

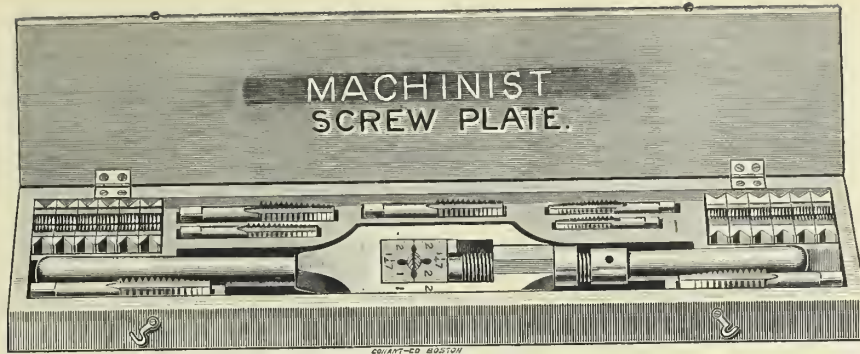


This Plate is drop-forged from special gun steel. The dies are made in one piece, from the best tool steel, and are cut open on one side. The plate is provided with three center-pointed screws, one of which enters the opening cut in the die, and the two others enter holes in the die opposite each other. By this arrangement the dies can be slightly opened or closed. The dies cut a full thread at once running over. We guarantee them to be a first class tool in every respect. Length, 6¼ inches. Price, with 5 dies and taps, cutting sizes of American Screw Company's standard:

No. 4, 36; No. 6, 32; No. 8, 32; No. 10, 24; No. 12, 24, -	\$5.00
Single dies, each, - - - - -	.50
Nickel plated, in Morocco case, - - - - -	6.00
Standard plate and 5 dies - - - - -	4.00
Standard plate, without dies and taps, - - - - -	2.00

DIES IN STOCK FOR THE STANDARD PLATE.

Size.	No. Threads to Inch.	Size.	No. Threads to Inch.
No. 4	32, 36, 40	No. 10	24, 30, 32
No. 6	30, 32	No. 12	20, 24
No. 8	24, 30, 32	No. 14	20, 24



MACHINISTS' SCREW PLATES.

- No. 7 A
27 inches long, 3 pair dies and 3 taps; cutting $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8. Each, \$10.
- No. 7 B
27 inches long, 9 pair dies and 9 taps; cutting $\frac{1}{4}$, 20; $\frac{5}{8}$, 18; $\frac{3}{8}$, 16; $\frac{7}{8}$, 14; $\frac{1}{2}$, 12; $\frac{5}{8}$, 11; $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8. Each, \$21.
- No. 7 C
27 inches long, 7 pair dies and 7 taps; cutting $\frac{3}{8}$, 16; $\frac{7}{8}$, 14; $\frac{1}{2}$, 12; $\frac{5}{8}$, 11; $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8. Each, \$18.
- No. 7 D
27 inches long, 5 pair dies and 5 taps; cutting $\frac{1}{2}$, 12; $\frac{5}{8}$, 11; $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8. Each, \$13.50.
- No. 8 A
30 inches long, 4 pair dies and 4 taps; cutting $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8; $1\frac{1}{4}$, 7. Each, \$13.60.
- No. 8 B
30 inches long; 7 pair dies and 7 taps; cutting $\frac{1}{2}$, 12; $\frac{5}{8}$, 11; $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8; $1\frac{1}{4}$, 7. Each, \$24.
- No. 8 C
30 inches long, 3 pair dies and 3 taps; cutting 1, 8; $1\frac{1}{8}$, 7; $1\frac{1}{4}$, 7. Each, \$11.75.
- No. 8 D
30 inches long, 3 pair dies and 3 taps; cutting $\frac{7}{8}$, 9; 1, 8; $1\frac{1}{4}$, 7. Each, \$11.25.
- No. 9 A
44 inches long, 3 pair dies and 3 taps; cutting 1, 8; $1\frac{1}{4}$, 7; $1\frac{1}{2}$, 6. Each, \$22.
- No. 9 B
44 inches long, 4 pair dies and 4 taps; cutting 1, 8; $1\frac{1}{8}$, 7; $1\frac{1}{4}$, 7; $1\frac{1}{2}$, 6. Each, \$26.

- No. 9 C
44 inches long, 5 pair dies and 5 taps; cutting $\frac{7}{8}$, 9; 1, 8; $1\frac{1}{8}$, 7; $1\frac{1}{4}$, 7; $1\frac{1}{2}$, 6. Each, \$29.
- No. 9 D
44 inches long, 6 pair dies and 6 taps; cutting $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8; $1\frac{1}{8}$, 7; $1\frac{1}{4}$, 7; $1\frac{1}{2}$, 6. Each, \$32.
- No. 9 E
44 inches long, 8 pair dies and 8 taps; cutting $\frac{1}{2}$, 12; $\frac{5}{8}$, 11; $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8; $1\frac{1}{8}$, 7; $1\frac{1}{4}$, 7; $1\frac{1}{2}$, 6. Each, \$37.50.
- No. 10 A
50 inches long, 6 pair dies and 6 taps; cutting $1\frac{3}{8}$, 6; $1\frac{1}{2}$, 6; $1\frac{5}{8}$, 5; $1\frac{3}{4}$, 5; $1\frac{7}{8}$, 5; 2, 4; $2\frac{1}{2}$. \$50.
- No. 10 B
50 inches long, 9 pair dies and 9 taps; cutting 1, 8; $1\frac{1}{8}$, 7; $1\frac{1}{4}$, 7; $1\frac{3}{8}$, 6; $1\frac{1}{2}$, 6; $1\frac{5}{8}$, 5; $1\frac{3}{4}$, 5; $1\frac{7}{8}$, 5; 2, 4; $2\frac{1}{2}$. Each, \$64.50.
- No. 10 C
50 inches, 11 pair dies and 11 taps; cutting $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8; $1\frac{1}{8}$, 7; $1\frac{1}{4}$, 7; $1\frac{3}{8}$, 6; $1\frac{1}{2}$, 6; $1\frac{5}{8}$, 5; $1\frac{3}{4}$, 5; $1\frac{7}{8}$, 5; 2, 4; $2\frac{1}{2}$. Each, \$72.
- No. 10 D
50 inches long, 3 pair dies and 3 taps; cutting $1\frac{1}{2}$, 6; $1\frac{3}{4}$, 5; 2, 4; $2\frac{1}{2}$. Each, \$33.
- No. 10 E
50 inches long, 4 pair dies and 4 taps; cutting $1\frac{1}{2}$, 6; $1\frac{5}{8}$, 5; $1\frac{3}{4}$, 5; 2, 4; $2\frac{1}{2}$. Each, \$39.
- No. 10 F
50 inches long, 5 pair dies and 5 taps; cutting $1\frac{1}{2}$, 6; $1\frac{5}{8}$, 5; $1\frac{3}{4}$, 5; $1\frac{7}{8}$, 5; 2, 4; $2\frac{1}{2}$. Each, \$45.

WATCH MAKERS' SCREW PLATE.

FIG. 865.



- No. 1.
Stock, $3\frac{1}{4}$ inches long; dies, $\frac{1}{16}$ inch in diam.; 4 taps and 5 dies, including tap wrench die; cutting 80, 100, 120, 140 threads, \$3.50.

The sizes and threads in this plate correspond to the sizes of watch-screws.

The dies in this plate are adjustable for making tight or loose fits.

JEWELERS' SCREW PLATE.

FIG. 866.

No. 1.

Stock, $3\frac{1}{4}$ inches long; dies, $\frac{1}{16}$ inch in diam.; 4 taps and 5 dies, including tap wrench die; cutting $\frac{1}{16}$, 72; $\frac{3}{32}$, 60; $\frac{1}{8}$, 50; $\frac{9}{64}$, 40. Each, \$3.50.

We have selected these sizes and threads as those best suited to the use of jewelers.

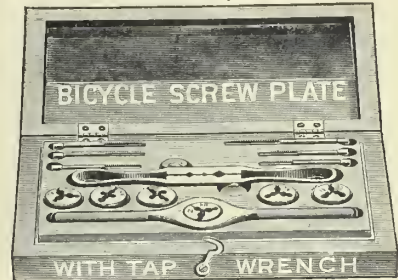
The dies in this plate are adjustable for making tight or loose fits.



BICYCLE SCREW PLATES.

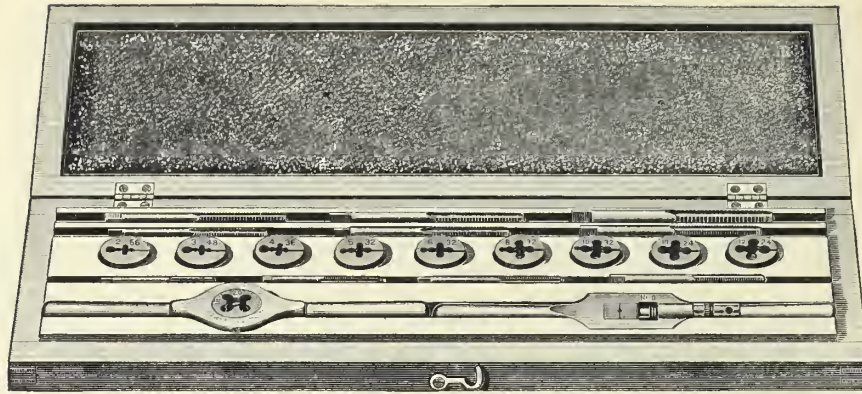
COMPLETE WITH ADJUSTABLE TAP WRENCH AND ROUND ADJUSTABLE DIES $\frac{5}{8}$ OF AN INCH IN DIAMETER.

FIG. 867.



- SET No. 1.—Dies $\frac{5}{8}$ of an inch in diameter, 6 dies and 6 taps; cutting $\frac{3}{32}$, 54; $\frac{1}{8}$, 40; $\frac{1}{4}$, 42; 3, 48; 3, 56; 6, 38. Price, complete, in hard wood case, \$5.00.
- SET No. 2.—Dies $\frac{5}{8}$ of an inch in diameter; 6 dies and 6 taps; cutting $\frac{3}{32}$, 56; $\frac{7}{64}$, 56; $\frac{1}{4}$, 40; 1, 64; $1\frac{1}{2}$, 56; 2, 48. Price, complete, in hard wood case, \$5.00.
- SET No. 3.—Dies $\frac{5}{8}$ of an inch in diameter; 14 dies and 14 taps; cutting $\frac{3}{32}$, 52; $\frac{3}{32}$, 54; $\frac{3}{32}$, 56; $\frac{7}{64}$, 56; $\frac{1}{8}$, 40; $\frac{1}{8}$, 42; $\frac{1}{4}$, 40; 1, 64; $1\frac{1}{2}$, 56; 2, 48; 3, 48; 3, 56; 4, 42; 6, 38. Price, complete, in hard wood case, \$10.00.
- SET No. 4.—Dies $\frac{5}{8}$ of an inch in diameter; 6 dies and 6 taps; cutting 1, 72; 1, 64; $1\frac{1}{8}$, 72; 2, 56; 3, 56; 105, 40. Price, complete, in hard wood case, \$5.00.

Stocks for above plates 5 inches long.



DIAMOND SCREW PLATES.

Diamond A

Diamond plate with tap wrench. Plate, 5 inches long; tap wrench, 5 inches long; 6 dies $\frac{5}{8}$ of an inch in diameter, and 6 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24; 14, 20. Each, \$6.

Diamond B

Diamond plate with tap wrench. Plate, 5 inches long; tap wrench, 5 inches long; 5 dies $\frac{5}{8}$ of an inch in diameter, and 5 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24. Each, \$5.25.

Diamond C

Diamond plate with tap wrench. Plate, 5 inches long; tap wrench, 5 inches long; 4 dies $\frac{5}{8}$ of an inch in diameter, and 4 taps; cutting 6, 32; 8, 32; 10, 24; 12, 24. Each, \$4.60.

Diamond D

Diamond plate with tap wrench. Plate, 5 inches long; tap wrench, 5 inches long; 8 dies $\frac{5}{8}$ of an inch in diameter, and 8 taps; cutting 2, 56; 3, 48; 4, 36; 5, 32; 6, 32; 10, 24; 12, 24; 14, 20. Each, \$7.30.

Diamond E

Diamond plate with tap wrench. Plate, 5 inches long; tap wrench, 5 inches long; 10 dies $\frac{5}{8}$ of an inch in diameter, and 10 taps; cutting 2, 56; 3, 48; 4, 36; 5, 32; 6, 32; 8, 32; 10, 32; 10, 24; 12, 24; 14, 20. Each, \$8.35.

Diamond N

Diamond plate with tap wrench. Plate, 7 inches long; tap wrench, 7 $\frac{1}{2}$ inches long; 5 dies $1\frac{1}{8}$ of an inch in diameter, and 5 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24. Each, \$5.75.

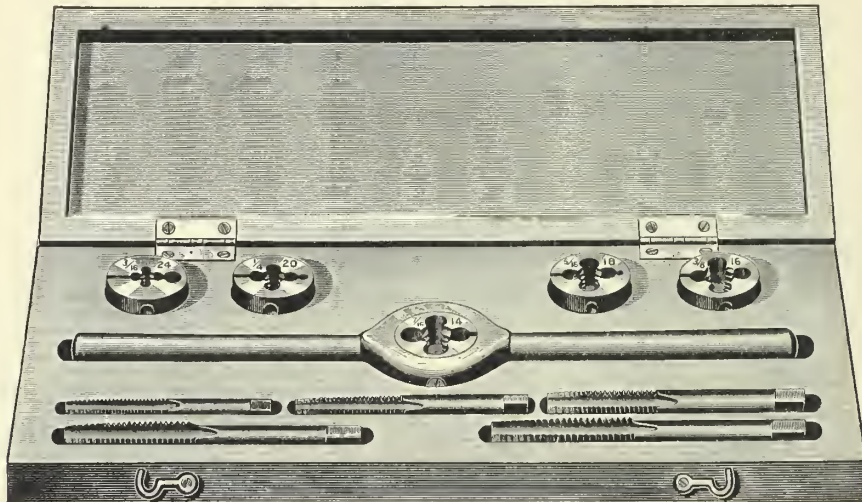
Diamond O

Diamond plate with tap wrench. Plate, 7 inches long; tap wrench, 7 $\frac{1}{2}$ inches long; 7 dies $1\frac{1}{8}$ of an inch in diameter, and 7 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24; 14, 20; 16, 18. Each, \$7.

Diamond P

Diamond plate with tap wrench. Plate, 7 inches long; tap wrench, 7 $\frac{1}{2}$ inches long; 8 dies $1\frac{1}{8}$ of an inch in diameter, and 8 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24; 14, 20; 16, 18; 18, 18. \$8.

FIG. 869.



DIAMOND SCREW PLATES.

No. 16

Diamond plate, 9 inches long; 5 dies, 1 inch in diameter, and 5 taps; cutting $\frac{3}{16}$, 24; $\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16; $\frac{7}{8}$, 14. Each, \$7.50.

No. 17

Diamond plate, 9 inches long; 4 dies, 1 inch in diameter, and 4 taps; cutting $\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16; $\frac{7}{8}$, 14. Each, \$6.50.

No. 17 A

Diamond plate, 9 inches long; 3 dies, 1 inch in diameter, and 3 taps; cutting $\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16. Each, \$5.00.

No. 18

Diamond plate, 9 inches long; 6 dies, 1 inch in diameter, and 6 taps; cutting 12, 24; 14, 20; 16, 18; 18, 18; 20, 16; 24, 16. Each, \$8.00.

No. 18 A

Diamond plate, 9 inches long; 5 dies, 1 inch in diameter, and 5 taps; cutting 12, 24; 14, 20; 16, 18; 18, 18; 20, 16. Each, \$7.00.

No. 19

Diamond plate, 9 inches long; 4 dies, 1 inch in diameter, and 4 taps; cutting 14, 20; 16, 18; 18, 18; 20, 16. Each, \$5.75.

No. 21

Diamond plate, 12 inches long; 6 dies, $1\frac{5}{16}$ inches in diameter, and 6 taps; cutting $\frac{3}{16}$, 24; $\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16; $\frac{7}{8}$, 14; $\frac{1}{2}$, 12. Each, \$10.00.

No. 22

Diamond plate, 12 inches long; 5 dies, $1\frac{5}{16}$ inches in diameter, and 5 taps; cutting $\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16; $\frac{7}{8}$, 14; $\frac{1}{2}$, 12. Each, \$9.00.

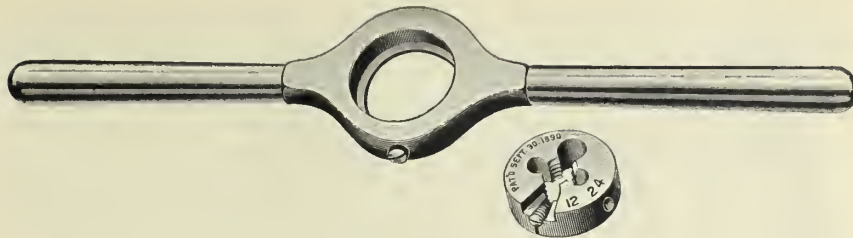
No. 23

Diamond plate, 12 inches long; 4 dies, $1\frac{5}{16}$ inches in diameter, and 4 taps; cutting $\frac{1}{4}$, 20; $\frac{5}{16}$, 18; $\frac{3}{8}$, 16; $\frac{1}{2}$, 12. Each, \$7.75.

No. 24

Diamond plate, 12 inches long; 3 dies, $1\frac{5}{16}$ inches in diameter, and 3 taps; cutting $\frac{1}{4}$, 20; $\frac{3}{8}$, 16; $\frac{1}{2}$, 12. Each, \$6.50.

FIG. 870.



DIAMOND SCREW PLATES.

Diamond Q

Diamond plate with tap wrench. Plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 5 dies 13-16 of an inch in diameter, and 5 taps; cutting $\frac{1}{8}$, 32; 5-32, 32; 3-16, 24; 7-32, 24; $\frac{1}{4}$, 20. Each, \$5.75.

Diamond R

Diamond plate with tap wrench. Plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 6 dies 13-16 of an inch in diameter, and 6 taps; cutting $\frac{1}{8}$, 32; 5-32, 32; 3-16, 24; 7-32, 24; $\frac{1}{4}$, 20; 5-16, 18. \$6.50.

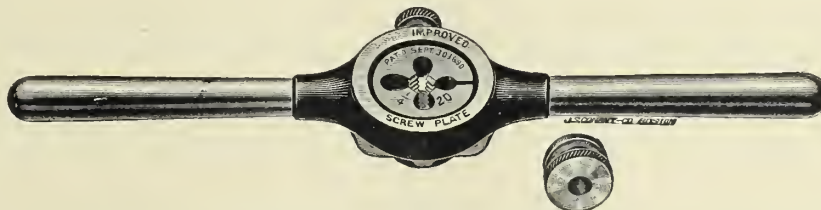
Diamond S

Diamond plate with tap wrench. Plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 5 dies 13-16 of an inch in diameter, and 5 taps; cutting 1-16, 72; $\frac{1}{8}$, 32; 3-16, 24; $\frac{1}{4}$, 20; 5-16, 18. Each, \$5.75.

Diamond T

Diamond Plate with tap wrench. Plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 9 dies 13-16 of an inch in diameter, and 9 taps; cutting 1-16, 72; 3-32, 56; $\frac{1}{8}$, 32; 5-32, 32; 3-16, 24; 7-32, 24; $\frac{1}{4}$, 20; 9-32, 20; 5-16, 18. Each, \$8.50.

FIG. 871.



IMPROVED SCREW PLATES.

No. 50

Improved plate with tap wrench; plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 5 dies, 13-16 of an inch in diameter, 5 guides and 5 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24. Each, \$5.75.

No. 51

Improved plate with tap wrench; plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 7 dies, 13-16 of an inch in diameter, 7 guides and 7 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24; 14, 20; 16, 18. Each, \$7.

No. 52

Improved plate with tap wrench; plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 8 dies, 13-16 of an inch in diameter, 8 guides and 8 taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24; 14, 20; 16, 18; 18, 18. Each, \$8.

No. 53

Improved plate with tap wrench; plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 5 dies, 13-16 of an inch in diameter, 5 guides and 5 taps; cutting $\frac{1}{8}$, 32; 5-32, 32; 3-16, 24; 7-32, 24; $\frac{1}{4}$, 20. Each, \$5.75.

No. 54

Improved plate with tap wrench; plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 6 dies, 13-16 of an inch in diameter, 6 guides and 6 taps; cutting $\frac{1}{8}$, 32; 5-32, 32; 3-16, 24; 7-32, 24; $\frac{1}{4}$, 20; 5-16, 18. Each, \$6.50.

No. 55

Improved plate with tap wrench; plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 4 dies, 13-16 of an inch in diameter, 4 guides and 4 taps; cutting $\frac{1}{8}$, 32; 3-16, 24; $\frac{1}{4}$, 20; 5-16, 18. Each, \$5.25.

No. 56

Improved plate with tap wrench; plate, 7 inches long; tap wrench, $7\frac{1}{2}$ inches long; 7 dies, 13-16 of an inch in diameter, 7 guides and 7 taps; cutting $\frac{1}{8}$, 32; 5-32, 32; 3-16, 24; 7-32, 24; $\frac{1}{4}$, 20; 9-32, 20; 5-16, 18. Each, \$7.

Smith patent adjustable dies and plug machine screw taps are sent with plates 50, 51 and 52.

Each complete plate as catalogued, sent in hardwood case.

Smith patent adjustable dies and machinists' plug hand taps are sent with plates 53, 54, 55 and 56.

Each complete plate sent in hardwood case.

FIG. 872.

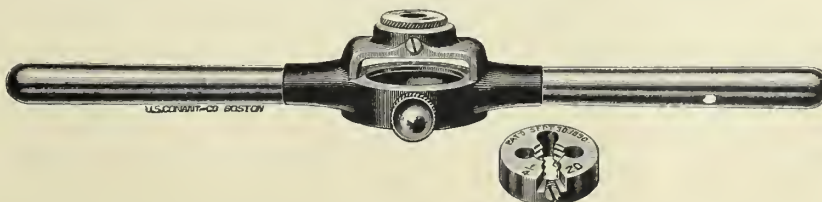
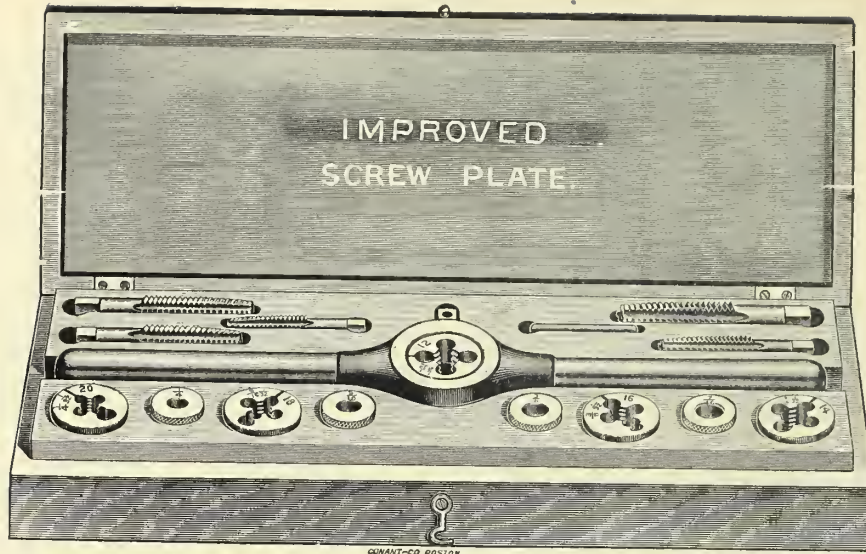


FIG. 873.



IMPROVED SCREW PLATES.

No. 60

Improved screw plate, 10½ inches long; 5 dies, 1 inch in diameter, 5 guides and 5 taps; cutting 3-16, 24; ¼, 20; 5-16, 18; ⅜, 16; 7-16, 14. Each, \$8.75.

No. 60 A

Improved screw plate, 10½ inches long; 4 dies, 1 inch in diameter, 4 guides and 4 taps; cutting ¼, 20; 5-16, 18; ⅜, 16; 7-16, 14. Each, \$7.50.

No. 70

Improved screw plate, 14 inches long; 5 dies, 1 5-16 inches in diameter, 5 guides and 5 taps; cutting ¼, 20; 5-16, 18; ⅜, 16; 7-16, 14; ½, 12. Each, \$10.50.

No. 70 A

Improved screw plate, 14 inches long; 4 dies, 1 5-16 inches in diameter, 4 guides and 4 taps; cutting 5-16, 18; ⅜, 16; 7-16, 14; ½, 12. Each, \$8.90.

No. 80

Improved screw plate, 23 inches long; 7 dies, 1¾ inches in diameter, 7 guides and 7 taps; cutting ¼, 20; 5-16, 18; ⅜, 16; 7-16, 14; ½, 12; ⅝, 11; ¾, 10. Each, \$16.

No. 80 A

Improved screw plate, 23 inches long; 5 dies, 1¾ inches in diameter, 5 guides and 5 taps; cutting ⅝, 16; 7-16, 14; ½, 12; ⅝, 11; ¾, 10. Each, \$13.

No. 80 B

Improved screw plate, 23 inches long; 3 dies, 1¾ inches in diameter, 3 guides and 3 taps; cutting ½, 12; ⅝, 11; ¾, 10. Each, \$9.25.

No. 90

Improved screw plate, 29 inches long; 9 dies, 2¼ inches in diameter, 9 guides and 9 taps; cutting ¼, 20; 5-16, 18; ⅜, 16; 7-16, 14; ½, 12; ⅝, 11; ¾, 10; ⅞, 9; 1, 8. Each, \$26.

No. 90 A

Improved screw plate, 29 inches long; 7 dies, 2¼ inches in diameter, 7 guides and 7 taps; cutting ⅝, 16; 7-16, 14; ½, 12; ⅝, 11; ¾, 10; ⅞, 9; 1, 8. Each, \$22.

No. 90 B

Improved screw plate, 29 inches long; 5 dies, 2¼ inches in diameter, 5 guides and 5 taps; cutting ½, 12; ⅝, 11; ¾, 10; ⅞, 9; 1, 8. Each, \$18.50.

No. 100

Two improved screw plates, 9 dies, 9 guides, and 9 taps. One stock, 14 inches long, with 5 dies, 5 guides, and 5 taps; cutting ¼, 20; 5-16, 18; ⅜, 16; 7-16, 14; ½, 12. These dies are 1 5-16 inches in diameter. One stock, 29 inches long, with 4 dies, 4 guides, and 4 taps; cutting ⅝, 11; ¾, 10; ⅞, 9; 1, 8. These dies are 2¼ inches in diameter. Complete in one case. Each, \$25.

No. 100 A

Two improved screw plates, 7 dies, 7 guides, and 7 taps. One stock, 10½ inches long, with 4 dies, 4 guides, and 4 taps; cutting ¼, 20; 5-16, 18; ⅜, 16; 7-16, 14. These dies are 1 inch in diameter. One stock, 23 inches long, 3 dies, 3 guides, and 3 taps; cutting ½, 12; ⅝, 11; ¾, 10. These dies are 1¾ inches in diameter. Complete in one case. Each, \$17.

Smith patent adjustable dies and hand-nut taps are sent with these plates.

The dies and taps in these plates are sent 1-32 over-size, unless even-size is specified on the order.

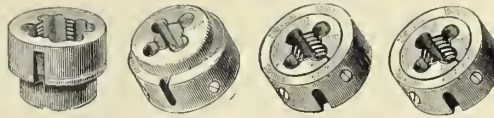
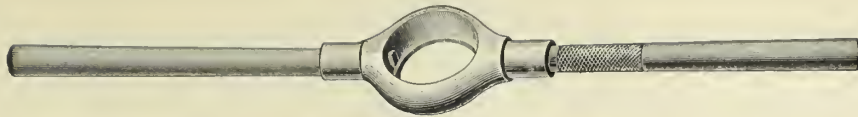
FIG. 874.



PATENT ADJUSTABLE TAP AND REAMER WRENCH.

No. 0.	Entire length, 6¾ inches, fitting taps from ⅛ to ¼ inch, reamers from ⅛ to ¼ inch,	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	</
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FIG. 875.



OUR FAVORITE SCREW PLATE.

No. 13 1-2 A

Our Favorite stock, 12 inches long; 5 dies, 1 inch in diameter, 5 collets and 5 taps; cutting 3-16, 24; $\frac{1}{4}$, 20; 5-16, 18; $\frac{3}{8}$, 16; 7-16, 14. Each, \$10.

No. 13 1-2 B.

Our Favorite stock, 12 inches long; 5 dies, 1 inch in diameter, 5 collets and 5 taps; cutting 3-16, 24; $\frac{1}{4}$, 20; 5-16, 18; $\frac{3}{8}$, 16; 7-16, 14; all 1-32 over-size for rough iron. Each, \$10.

No. 13 1-2 C

Our Favorite stock, 12 inches long; 7 dies, 1 inch in diameter, 7 collets and 7 taps; cutting 10, 24; 12, 24; 14, 20; 16, 18; 18, 18; 20, 16; 24, 16. Each, \$13.

No. 13 1-2 D

Our Favorite stock, 12 inches long; 5 dies, 1 inch in diameter, 5 collets and 5 taps; cutting 14, 20; 16, 18; 18, 18; 20, 16; 24, 16. Each, \$10.

No. 14

Our Favorite stock, 18 inches long; 6 dies, 1 9-16 inches in diameter, 6 collets and 6 taps; cutting $\frac{1}{4}$, 20; 5-16, 18; $\frac{3}{8}$, 16; 7-16, 14; $\frac{1}{2}$, 12; $\frac{5}{8}$, 11. Each, \$18.

No. 15

Our Favorite stock, 24 inches long; 5 dies, 2 $\frac{1}{4}$ inches in diameter, 5 collets and 5 taps; cutting $\frac{1}{2}$, 12; $\frac{5}{8}$, 11; $\frac{3}{4}$, 10; $\frac{7}{8}$, 9; 1, 8. Each, \$25.75.

FIG. 876.



ARRANGED FOR BRASS WORK.

No. 13 1-2 X

Our Favorite stock, 12 inches long; 5 dies, 1 inch in diameter, 5 collets and 5 taps; cutting $\frac{1}{8}$, 27; 3-16, 27; $\frac{1}{4}$, 27; 5-16, 27; $\frac{3}{8}$, 27. Each, \$10.65.

No. 14 X

Our Favorite stock, 18 inches long; 4 dies, 1 and 9-16 inches in diameter, 4 collets and 4 taps; cutting $\frac{3}{8}$, 27; 7-16, 27; $\frac{1}{2}$, 27; $\frac{5}{8}$, 27. Each, \$13.55.

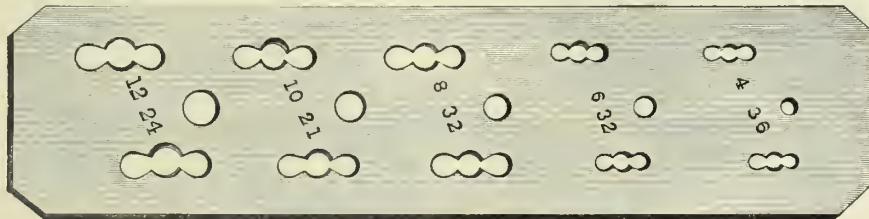
No. 15 X

Our Favorite stock, 24 inches long; 5 dies, 2 and $\frac{1}{4}$ inches in diameter, 5 collets and 5 taps; cutting $\frac{1}{2}$, 27; $\frac{5}{8}$, 27; $\frac{3}{4}$, 27; $\frac{7}{8}$, 27; 1, 27. \$25.75.

The dies and taps in these plates are for use on brass.

Smith patent adjustable dies are sent with all Our Favorite screw plates.

FIG. 877.



THE NEW SMITH PLATES.

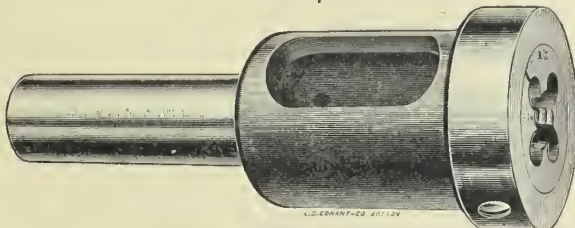
No. A

Cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24; Each, \$1.50

No. B

Cutting 4, 36; 6, 32; 8, 30; 10, 24; 12, 24; " 1.50

FIG. 878.



DIE HOLDERS.

FOR USE IN LATHE OR TURRET OF SCREW MACHINE.

No. 1

Holding round adjustable dies $\frac{5}{8}$ of an inch in diameter. Each, 75c.

The shanks of the No. 1 holders are $\frac{1}{2}$ inch in diameter.

No. 1 1-2

Holding Smith patent adjustable dies 13-16 of an inch in diameter. Each, 85c.

The shanks of the No. 1 $\frac{1}{2}$ holders are $\frac{1}{2}$, 9-16, and 11-16 inch in diameter.

No. C

Cutting 6, 32; 8, 32; 10, 24; 12, 24; 14, 20; Each, \$2.00

The center row of holes in the Smith plate gives the size of wire for threading.

No. 2

Holding Smith patent adjustable dies 1 inch in diameter. Each, \$1.

The shanks of the No 2 holders are $\frac{1}{2}$, 9-16 and 11-16 inch in diameter.

No. 3

Holding Smith patent adjustable dies 1 5-16 inch in diameter. Each \$1.75.

The shanks of the No. 3 holders are 11-16, $\frac{3}{4}$ and 13-16 inch in diameter.

No. 4

Holding Smith patent adjustable dies 1 9-16 inches in diameter. Each, \$2.75.

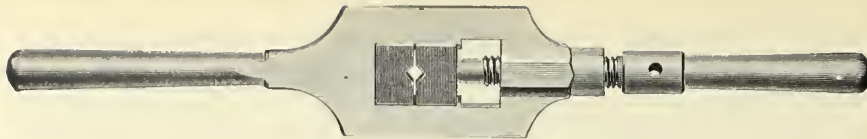
The shanks of the No. 4 holders are $\frac{3}{4}$, 13-16 and 1 inch in diameter.

No. 5

Holding Smith patent adjustable dies 2 $\frac{1}{4}$ inches in diameter. Each, \$4.

The shanks of the No. 5 holders are 1 1-16, 1 $\frac{1}{8}$, and 1 $\frac{1}{4}$ inches in diameter.

FIG. 879.

**TAP WRENCHES.**

No. 0	5 inches long ; fitting taps 1-16 to 3-16,	- -	Each, \$1.00	No. 3	14 inches long ; fitting taps 1/2 to 3/4, - - -	Each, \$3.00
No. 1	7 1/2 inches long ; fitting taps 1/8 to 3/8,	- -	" 1.50	No. 4	19 inches long ; fitting taps 3/4 to 1 1/8, - -	" 4.00
No. 1 1-2	10 inches long ; fitting taps 3-16 to 1/2,	- -	" 2.00	No. 5	24 inches long ; fitting taps 7/8 to 1 1/2, - - -	" 5.25
No. 2	12 inches long ; fitting taps 1/4 to 5/8,	- -	" 2.00			

FIG. 880.

**CHASERS FOR SCREWS.**

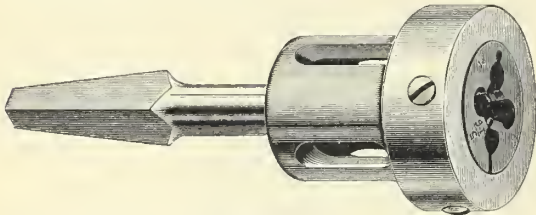
Cutting 5, 6, 7, 8, 9, 10, 11, 11 1/2, 12, 13, 14, 15 and 16 threads to the inch. Each, 30c. Per pair, 60c.

Cutting 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 56, 60, 62, 64 and 70 threads to the inch. Each, 25c. Per pair, 50c.

These Screw Chasers have V threads.

Threads not given in above list will be charged at special prices.

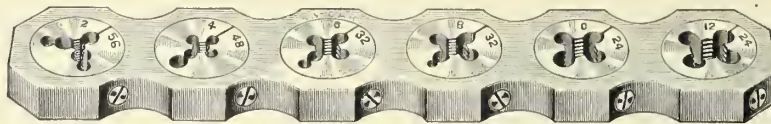
FIG. 881.

**BIT-BRACE DIE HOLDERS.**

- No. 1 Holding round adjustable dies 5/8 of an inch in diameter. Each, 75c.
- No. 2 Holding Smith patent adjustable dies 13-16 of an inch in diameter. Each, 85c.
- No. 3 Holding Smith patent adjustable dies 1 inch in diameter. Each, \$1.

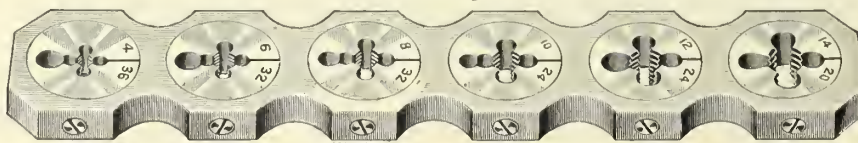
- No. 3 N No. 3 holder, with Smith patent adjustable die, 1 inch in diameter, and one bit brace tap, cutting 3-16, 24. Each, \$2.
- No. 3 O No. 3 holder, with Smith patent adjustable die, 1 inch in diameter, and one bit brace tap, cutting 1/4, 20. Each, \$2.
- No. 3 P No. 3 holder, with Smith patent adjustable die, 1 inch in diameter, and one bit brace tap, cutting 5-16, 18. Each, \$2.
- No. 3 Q No. 3 holder, with Smith patent adjustable die, 1 inch in diameter, and one bit brace tap, cutting 3/8, 16. Each, \$2.25. For pump rods, holder and die only. Each, \$1.75.
- No. 3 R No. 3 holder, with Smith patent adjustable die, 1 inch in diameter, and one bit brace tap, cutting 7-16, 14. Each, \$2.60. For pump rods, holder and die only. Each, \$1.75.
- No. 3 S No. 3 holder, with Smith patent adjustable die, 1 inch in diameter, and one bit brace tap, cutting 1/2, 12. Each, \$2.75. For pump rods, holder and die only. Each, \$1.75.

FIG. 882.

**THE MANSFIELD DIE HOLDERS.**

- No. 1 Holding 6 round adjustable dies, 5/8 of an inch in diameter, - - - Each, \$2.00

FIG. 883.



- No. 2 Holding 6 Smith patent adjustable dies, 13-16 of an inch in diameter, - - - \$2.25

The above prices are for the holders only.
These Die Holders are made of Bessemer steel.

PATENT ADJUSTABLE DIES.

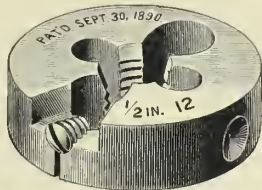
SIZE OF DIE. Diameter.	Thick- ness.	Size and No. of Screw Gauge.	Standard No. of Threads to Inch.	Threads also Furnished.	Price Each.
1 inch	3/8 inch	No. 4	36 inches	32 and 40 inches	\$0 75
1 inch	3/8 inch	No. 5	36 inches	30, 32 and 40 inches	75
1 inch	3/8 inch	No. 6	36 inches	30, 32 and 40 inches	75
1 inch	3/8 inch	No. 7	32 inches	28 and 30 inches	75
1 inch	3/8 inch	No. 8	32 inches	24 and 30 inches	75
1 inch	3/8 inch	No. 9	30 inches	24, 28 and 32 inches	75
1 inch	3/8 inch	No. 10	24 inches	28, 30 and 32 inches	75
1 inch	3/8 inch	No. 11	24 inches	28 and 30 inches	75
1 inch	3/8 inch	No. 12	24 inches	20, 22 and 28 inches	75
1 inch	3/8 inch	No. 13	22 inches	20 and 24 inches	75
1 inch	3/8 inch	No. 14	22 inches	22 and 24 inches	75
1 inch	3/8 inch	No. 15	20 inches	18, 22 and 24 inches	75
1 inch	3/8 inch	No. 16	18 inches	16, 20 and 24 inches	75
1 inch	3/8 inch	No. 17	18 inches	16 and 20 inches	75
1 inch	3/8 inch	No. 18	18 inches	16 and 20 inches	75
1 inch	3/8 inch	No. 19	18 inches	16 and 20 inches	75
1 inch	3/8 inch	No. 20	16 inches	18 and 20 inches	75
1 inch	3/8 inch	No. 22	16 inches	18 inches	75
1 inch	3/8 inch	No. 24	16 inches	14 and 18 inches	75
1 inch	3/8 inch	1 1/8 inch	40 inches	32 and 36 inches	75
1 inch	3/8 inch	9-64 inch	40 inches	32 and 36 inches	75
1 inch	3/8 inch	5-32 inch	32 inches	36 and 40 inches	75
1 inch	3/8 inch	11-64 inch	32 inches	36 and 40 inches	75
1 inch	3/8 inch	5-16 inch	24 inches	22, 32 and 36 inches	75
1 inch	3/8 inch	13-64 inch	24 inches	22, 32 and 36 inches	75
1 inch	3/8 inch	7-32 inch	24 inches	28, 32 and 36 inches	75
1 inch	3/8 inch	15-64 inch	24 inches	28, 32 and 36 inches	75
1 inch	3/8 inch	1/4 inch	20 inches	16 and 18 inches	75
1 inch	3/8 inch	5-16 inch	18 inches	16 and 20 inches	75
1 inch	3/8 inch	3/8 inch	16 inches	14 and 18 inches	75
1 inch	3/8 inch	7-16 inch	14 inches	16 inches	75

SIZE OF DIE. Diameter.	Thick- ness.	Cutting Size.	Standard No. of Threads to Inch.	Threads also Furnished.	Price Each.
1 5-16 inches	7-16 inch	3 16 inch	24 inches	22, 32 and 36 inches	\$1 00
1 5-16 inches	7 16 inch	13-64 inch	24 inches	22, 32 and 36 inches	1 00
1 5-16 inches	7-16 inch	7-34 inch	24 inches	28, 32 and 36 inches	1 00
1 5-16 inches	7-16 inch	15-64 inch	24 inches	28, 32 and 36 inches	1 00
1 5-16 inches	7-16 inch	1/4 inch	20 inches	16 and 18 inches	1 00
1 5-16 inches	7-16 inch	5-16 inch	18 inches	16 inches	1 00
1 5-16 inches	7-16 inch	3/8 inch	16 inches	14 and 18 inches	1 00
1 5-16 inches	7-16 inch	7-16 inch	14 inches	16 inches	1 00
1 5-16 inches	7-16 inch	1/2 inch	12 inches	13 and 14 inches	1 00
1 9-16 inches	9-16 inch	1/4 inch	20 inches	16 and 18 inches	1 25
1 9-16 inches	9-16 inch	5-16 inch	18 inches	16 inches	1 25
1 9-16 inches	9-16 inch	3/8 inch	16 inches	14 and 18 inches	1 25
1 9-16 inches	9-16 inch	7-16 inch	14 inches	16 inches	1 25
1 9-16 inches	9 16 inch	1/2 inch	12 inches	13 and 14 inches	1 25
1 9-16 inches	9-16 inch	9-16 inch	12 inches	14 inches	1 25
1 9-16 inches	9-16 inch	5/8 inch	11 inches	10 and 12 inches	1 25
2 1-4 inches	3/4 inch	1-4 inch	20 inches	16 and 18 inches	1 50
2 1-4 inches	3/4 inch	5-16 inch	18 inches	16 inches	1 50
2 1-4 inches	3/4 inch	3/8 inch	16 inches	14 and 18 inches	1 50
2 1-4 inches	3/4 inch	7-16 inch	14 inches	16 inches	1 50
2 1-4 inches	3/4 inch	1/2 inch	12 inches	13 and 14 inches	1 50
2 1-4 inches	3/4 inch	9-16 inch	12 inches	14 inches	1 50
2 1-4 inches	3/4 inch	5/8 inch	11 inches	10 and 12 inches	1 50
2 1-4 inches	3/4 inch	11-16 inch	11 inches	12 inches	2 10
2 1-4 inches	3/4 inch	3/4 inch	10 inches	12 inches	2 35
2 1-4 inches	3/4 inch	13-16 inch	10 inches	12 inches	2 50
2 1-4 inches	3/4 inch	7/8 inch	9 inches	10 inches	2 75
2 1-4 inches	3/4 inch	15-16 inch	9 inches	10 inches	3 00
2 1-4 inches	3/4 inch	1 inch	8 inches	10 inches	3 25

All orders for dies, 1 and 5-16, 1 and 9-16, and 2 and 1 1/4 inches in diameter, will be filled with this style of die, unless something different is specified.

These dies are sent with standard number of threads to the inch, unless otherwise specified on the order.
Special sizes and threads furnished at 50 per cent. advance on above list. Sizes and threads not given in this list will be considered special.

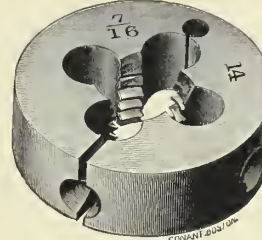
FIG. 884.



PATENT ADJUSTABLE DIES.

SIZE OF DIE. Diameter.	Thick- ness.	Size and No of Screw Gauge.	Standard No. of Threads to Inch.	Threads also Furnished.	Price Each.
13-16	1-4	No. 2	56	48 and 64	\$0 40
13-16	1-4	No. 3	48	40 and 56	.40
13-16	1-4	No. 4	36	32 and 40	.40
13-16	1-4	No. 5	36	30, 32 and 40	.40
13-16	1-4	No. 6	32	30, 36 and 40	.40
13-16	1-4	No. 7	32	28 and 30	.40
13-16	1-4	No. 8	32	24 and 30	.40
13-16	1-4	No. 9	30	24, 28 and 32	.40
13-16	1-4	No. 10	24	28, 30 and 32	.40
13-16	1-4	No. 11	24	28 and 30	.40
13-16	1-4	No. 12	24	20, 22 and 28	.40
13-16	1-4	No. 13	22	20 and 24	.40
13-16	1-4	No. 14	20	22 and 24	.40
13-16	1-4	No. 15	20	18, 22 and 24	.40
13-16	1-4	No. 16	18	16, 20 and 24	.40
13-16	1-4	1-16 inch	72	60 and 64	.40
13-16	1-4	5-64 inch	72	56, 60 and 64	.40
13-16	1-4	3-32 inch	56	48, 50 and 60	.40
13-16	1-4	7-64 inch	56	48, 50 and 60	.40
13-16	1-4	1-8 inch	40	32 and 36	.40
13-16	1-4	9 64 inch	40	32 and 36	.40
13-16	1-4	5 32 inch	32	36 and 40	.40
13-16	1-4	11-64 inch	32	36 and 40	.40
13-16	1-4	3-16 inch	24	22, 32 and 36	.40
13-16	1-4	13-64 inch	24	22, 28, 32 and 36	.40
13-16	1-4	7-32 inch	24	28, 32 and 36	.40
13-16	1-4	15-64 inch	24	28, 32 and 36	.40
13-16	1-4	1-4 inch	20	18, 22, 24, 26 and 32	.40
13-16	1-4	17-64 inch	20	18, 22, 24, 26 and 32	.40
13-16	1-4	9-32 inch	20	16 and 18	.40
13-16	1-4	5-16 inch	18	16 and 20	.40

No. 885.

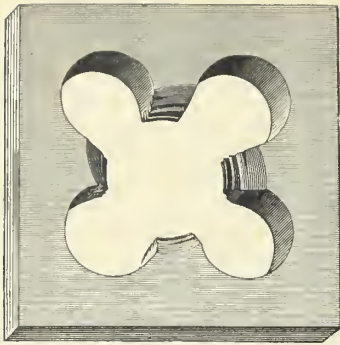


ROUND ADJUSTABLE DIES.

SIZE OF DIE. Diameter, inch.	Thick- ness, inch.	Size and No. of Screw Gauge.	Standard No. of Threads to Inch.	Threads also Furnished.	Price Each.
5/8	1/4	No. 2	56	48 and 64	\$0.40
5/8	1/4	No. 3	48	40 and 56	.40
5/8	1/4	No. 4	36	32 and 40	.40
5/8	1/4	No. 5	36	30, 32 and 40	.40
5/8	1/4	No. 6	32	30, 36 and 40	.40
5/8	1/4	No. 7	32	28 and 30	.40
5/8	1/4	No. 8	32	24 and 30	.40
5/8	1/4	No. 9	30	24, 28 and 32	.40
5/8	1/4	No. 10	24	28, 30 and 32	.40
5/8	1/4	No. 11	24	28 and 30	.40
5/8	1/4	No. 12	24	20, 22 and 28	.40
5/8	1/4	No. 13	22	20 and 24	.40
5/8	1/4	No. 14	20	22 and 24	.40
5/8	1/4	1-16 inch	72	60 and 64	.40
5/8	1/4	5-64 inch	72	56, 60 and 64	.40
5/8	1/4	3-32 inch	56	48, 50 and 60	.40
5/8	1/4	7-64 inch	56	48, 50 and 60	.40
5/8	1/4	1-8 inch	40	32 and 36	.40
5/8	1/4	9 64 inch	40	32 and 36	.40
5/8	1/4	5 32 inch	32	36 and 40	.40
5/8	1/4	11-64 inch	32	36 and 40	.40
5/8	1/4	3 16 inch	24	22, 32 and 36	.40
5/8	1/4	13-64 inch	24	22, 28, 32 and 36	.40
5/8	1/4	7-32 inch	24	28, 32 and 36	.40
5/8	1/4	15-64 inch	24	28, 32 and 36	.40
5/8	1/4	1-4 inch	20	18, 22, 24, 26 and 32	.40
5/8	1/4	17-64 inch	20	18, 22, 24, 26 and 32	.40

All dies 5/8 of an inch in diameter are made this style.
These dies are made with standard number of threads to the inch, unless a different thread is called for.

FIG. 886.



MACHINE OR SOLID BOLT DIES.

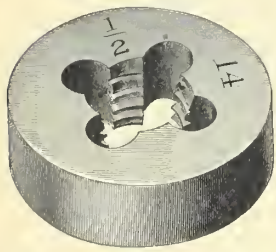
Cutting Size, Inches.	Standard No. of Threads to Inch.	Threads also Furnished.	OUTSIDE DIMENSIONS. Size of Square, Inches.	Thickness, Inches.	Price Each.
1-4	20	18	2 1/2	1/2	\$1.80
5-16	18	16	2 1/2	1/2	1.80
3-8	16	14	2 1/2	1/2	1.80
7-16	14	12	2 1/2	1/2	1.80
1-2	12	10	2 1/2	1/2	1.80
9-16	12	10	2 1/2	3/4	1.90
5-8	11	10	2 1/2	3/4	2.00
11-16	11	10	2 1/2	3/4	2.15
3-4	10	9	2 1/2	3/4	2.25
13-16	10	9	2 1/2	3/4	2.30
7-8	9	8	2 1/2	3/4	2.40
15-16	9	8	2 1/2	3/4	2.55
1	8	7	2 1/2	1	2.70
1 1/8	7	6	2 1/2	1	3.00
1 1/4	7	6	2 1/2	1	3.30
1 3/8	6	5	2 1/2	1	3.60
1 1/2	6	5	3	1	3.90
1 5/8	5	4	3	1	4.20
1 3/4	5	4	3	1 1/4	5.40
1 7/8	4 1/2	4	3 1/2	1 1/2	6.50
2	4 1/2	4	3 3/4	2	7.50

All Solid Bolt Dies will be sent even-size, unless over size is specified on the order.

Cutting Size, Inches.	Standard No. of Threads to Inch.	OUTSIDE DIMENSIONS. Size of Square, Inches.	Thickness, Inches.	Price Each.
1-4	20	3	3/4	\$2.30
5-16	18	3	3/4	2.30
3-8	16	3	3/4	2.30
7-16	14	3	3/4	2.30
1-2	12	3	3/4	2.30
9-16	12	3	3/4	2.40
5-8	11	3	3/4	2.50
11-16	11	3	3/4	2.65
3-4	10	3	3/4	2.75
13-16	10	3	3/4	2.80
7-8	9	3	3/4	2.90
15-16	9	3	3/4	3.05
1	8	3	1	3.40
1 1/8	7	3	1	3.60
1 1/4	7	3	1	3.70
1 3/8	6	3	1	3.80
1-4	20	4	3/4	2.50
5-16	18	4	3/4	2.50
3-8	16	4	3/4	2.50
7-16	14	4	3/4	2.50
1-2	12	4	3/4	2.80
9-16	12	4	3/4	2.90
5-8	11	4	3/4	3.00
11-16	11	4	3/4	3.15
3-4	10	4	3/4	3.25
13-16	10	4	3/4	3.30
7-8	9	4	3/4	3.40
15-16	9	4	3/4	3.55
1	8	4	1	4.20
1 1/8	7	4	1	4.50
1 1/4	7	4	1	4.80
1 3/8	6	4	1	5.00
1 1/2	6	4	1	5.25
1 5/8	5	4	1 1/4	5.50
1 3/4	5	4	1 1/2	6.15
1 7/8	4 1/2	4	1 1/2	7.50
2	4 1/2	4	2	8.00

All Solid Bolt Dies will be sent even-size, unless over-size is specified on the order.

FIG. 887.



ROUND SOLID DIES AND COLLETS FOR ADJUSTABLE DIES.

SIZE OF DIE.	Thickness.	Cutting Size—Inches.	Price Each.
Diameter.			
5/8 inch	1-4 inch	4, 36; 6, 32; 8, 32; 10, 24; 12, 24; 14, 20	\$0.40
1-4 inch	1-4 inch	1-16; 3-32; 7-64; 1/8; 3-16; 1-4	.40
1 inch	3/8 inch	3-16; 1-4; 5-16; 3/8; 7-16	.75
1 5-16 inches	7-16 inch	3-16; 1-4; 5-16; 3/8; 7-16; 1/2	1.00
1 9-16 inches	9-16 inch	1-4; 5-16; 3-8; 7-16; 1/2; 9-16; 5/8	1.25
2 1-4 inches	3-4 inch	1-4; 5-16; 3-8; 7-16; 1/2	1.50
2 1-4 inches	3-4 inch	9-16	1.80
2 1-4 inches	3-4 inch	5-8	1.90
2 1-4 inches	3-4 inch	3-4	2.35
2 1-4 inches	3-4 inch	7-8	2.75
2 1-4 inches	3-4 inch	1	3.25

These Dies are sent with standard number of threads to the inch, unless the thread is specified on the order.

COLLETS FOR ADJUSTABLE DIES.

No.	FITTING ADJUSTABLE DIE.	Thickness.	Price Each.
	Diameter.		
1	5/8 inch	1-4 inch	\$0.50
1 1/2	13-16 inch	1-4 inch	.50
2	1 inch	3-8 inch	.75
3	1 15-16 inch	7-16 inch	.75
4	1 19-16 inch	9-16 inch	.75
	2 1-4 inch	3-4 inch	1.00

FIG. 888.

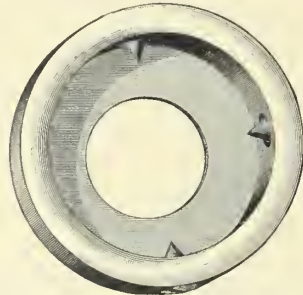
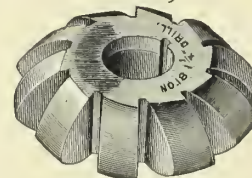


FIG. 889.



CUTTERS FOR GROOVING STRAIGHT LIPPED TWIST DRILLS.

No.	Price.	Diameter Drill.	Diameter Cutter.	Hole in Cutter
1	\$1.50	1-16 inches	1 3-4 inches	7-8 inches
2	1.70	1-8 inches	1 3-4 inches	7-8 inches
3	1.90	3-16 inches	1 3-4 inches	7-8 inches
4	2.10	1-4 inches	1 3-4 inches	7-8 inches
5	2.30	5-16 inches	2 inches	7-8 inches
6	2.40	3-8 inches	2 inches	7-8 inches
7	2.60	7-16 inches	2 inches	7-8 inches
8	2.80	1-2 inches	2 inches	7-8 inches
9	3.00	9-16 inches	2 1-8 inches	7-8 inches
10	3.20	5-8 inches	2 1-8 inches	7-8 inches
11	3.40	11-16 inches	2 1-8 inches	7-8 inches
12	3.60	3-4 inches	2 1-4 inches	7-8 inches
13	3.80	13-16 inches	2 1-4 inches	7-8 inches
14	4.00	7-8 inches	2 1-2 inches	7-8 inches
15	4.20	15-16 inches	2 1-2 inches	7-8 inches
16	4.50	1 inches	2 3-4 inches	7-8 inches
17	5.00	1 1-8 inches	2 3-4 inches	7-8 inches
18	5.50	1 1-4 inches	3 inches	7-8 inches
19	6.25	1 1-2 inches	3 1-2 inches	1 inches
20	7.00	1 3-4 inches	3 1-2 inches	1 inches
21	7.75	2 inches	3 3-4 inches	1 inches

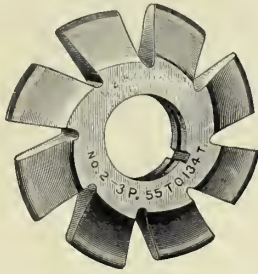
These cutters can be sharpened by grinding without changing their form. In ordering, give number of cutter or diameter of drill, as by above list.

SPECIAL GEAR CUTTERS.

Worm wheel cutters and cutters of special dimensions are made to order at special prices.

Spur and bevel gear cutters, shown in lists, when ordered with special size hole, are made to order at an advance of 50 cents each on list price. If six or more of one pitch are ordered with special size hole, the list price is charged.

FIG. 890.



PATENT INVOLUTE CUTTERS.

For teeth of gear wheels. All gears of same pitch cut with these cutters are interchangeable.

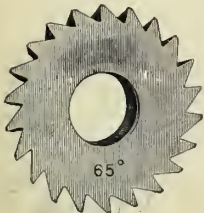
Diametrical Pitch.	Price of Each Cutter.	Diameter of Cutter.	Hole in Cutter
*2 inches	\$12.50	5 inches	I 1-4 inches
*2 1-4 inches	11.25	4 1-2 inches	I 1-4 inches
*2 1-2 inches	10.00	4 1-4 inches	I 1-4 inches
*2 3-4 inches	9.00	4 inches	I 1-4 inches
3 inches	7.00	3 13-16 inches	I 1-4 inches
*3 1-4 inches	6.50	3 11-16 inches	I 1-4 inches
*3 1-2 inches	6.25	3 1-2 inches	I 1-4 inches
*3 3-4 inches	6.00	3 3-8 inches	I 1-4 inches
4 inches	5.50	3 3-8 inches	I 1-4 inches
*4 1-2 inches	5.00	3 1-4 inches	I 1-4 inches
5 inches	4.50	3 1-16 inches	I 1-4 inches
*5 1-2 inches	4.20	2 7-8 inches	I 1-4 inches
6 inches	3.90	2 3-4 inches	I 1-16 inches
7 inches	3.60	2 9-16 inches	I 1-16 inches
8 inches	3.40	2 1-2 inches	I 1-16 inches
9 inches	3.20	2 3-8 inches	I 1-16 inches
10 inches	3.00	2 1-8 inches	7-8 inches
11 inches	2.75	2 1-16 inches	7-8 inches
12 inches	2.65	2 inches	7-8 inches
*13 inches	2.60	2 inches	7-8 inches
14 inches	2.55	2 inches	7-8 inches
*15 inches	2.50	2 inches	7-8 inches
16 inches	2.45	I 15-16 inches	7-8 inches
18 inches	2.35	I 15-16 inches	7-8 inches
20 inches	2.30	I 7-8 inches	7-8 inches
22 inches	2.20	I 13-16 inches	7-8 inches
24 inches	2.10	I 3-4 inches	7-8 inches
26 inches	1.95	I 3-4 inches	7-8 inches
28 inches	1.80	I 3-4 inches	7-8 inches
30 inches	1.80	I 3-4 inches	7-8 inches
32 inches	1.80	I 3-4 inches	7-8 inches
36 inches	1.80	I 3-4 inches	7-8 inches
*38 inches	1.80	I 3-4 inches	7-8 inches
40 inches	1.80	I 3-4 inches	7-8 inches
*44 inches	1.80	I 3-4 inches	7-8 inches
48 inches	1.80	I 3-4 inches	7-8 inches
*50 inches	1.80	I 3-4 inches	7-8 inches
*56 inches	1.80	I 3-4 inches	7-8 inches
*60 inches	1.80	I 3-4 inches	7-8 inches
*64 inches	1.80	I 3-4 inches	7-8 inches
*70 inches	1.80	I 3-4 inches	7-8 inches
*80 inches	1.80	I 3-4 inches	7-8 inches
*120 inches	1.80	I 3-4 inches	7-8 inches

Cutters marked * are made to order.

FIG. 891.

ANGULAR CUTTERS.

Owing to the increasing demand for these cutters, we have decided to carry them in stock. Angles are 40°, 45°, 50°, 60°, 70° and 80°, both right and left hand. Cutters are 2½ inches diameter, ½ inch thick, and have ⅞ inch hole. Each, \$2.25.



INVOLUTE GEAR CUTTERS.

EXTRA LARGE DIAMETER.

Diametrical Pitch.	Price.	Diameter of Center.	Hole in Center.
3 inches	\$8.00	4 3-4 inches	I 1-4 inches
*3 1-4 inches	7.75	4 1-2 inches	I 1-4 inches
*3 1-2 inches	7.25	4 1-2 inches	I 1-4 inches
*3 3-4 inches	6.75	4 1-4 inches	I 1-4 inches
4 inches	6.25	4 1-4 inches	I 1-4 inches
*4 1-2 inches	5.75	4 1-4 inches	I 1-4 inches
5 inches	3.25	4 inches	I 1-4 inches
*5 1-2 inches	5.00	4 inches	I 1-4 inches
6 inches	4.75	3 3-4 inches	I 1-4 inches
*7 inches	4.50	3 5-8 inches	I 1-4 inches
8 inches	4.25	3 1-2 inches	I 1-4 inches
*9 inches	4.00	3 1-2 inches	I 1-4 inches

Cutters marked * are made to order.

These Gear Cutters can be sharpened without changing their form. According to the system adopted by us any wheel of one pitch will gear into any other wheel or into a rack of the same pitch. Eight cutters are required for each pitch. These eight cutters are adapted to cut from a pinion of twelve teeth to a rack, and are numbered respectively as follows:

No.	1	2	3	4	5	6	7	8
Will cut wheels from	135 teeth	55	35	26	21	17	14	12
to a rack.	134 teeth.	54	34	25	20	16	13	

In ordering, give the No. of Cutter and Diametrical Pitch required. A stock of Cutters, from 3 to 48 pitch, is kept on hand. Cutters in stock can be ordered by telegraph. Form of telegram:—"Send one Cutter No. three, six pitch."

CUTTERS FOR MITRE AND BEVEL GEARS.

Diametrical Pitch.	Price.	Diameter of Each Cutter.	Hole in Cutter.
4 inches	\$5.50	3 3-8 inches	I 1-4 inches
5 inches	4.50	3 1-16 inches	I 1-4 inches
6 inches	3.90	2 3-4 inches	I 1-16 inches
8 inches	3.40	2 1-2 inches	I 1-16 inches
10 inches	3.00	2 1-8 inches	7-8 inches
12 inches	2.65	2 inches	7-8 inches
14 inches	2.55	2 inches	7-8 inches
16 inches	2.45	I 15-16 inches	7-8 inches
20 inches	2.30	I 7-8 inches	7-8 inches
24 inches	2.10	I 3-4 inches	7-8 inches

These cutters are carried in stock. Cutters for pitches not given in the above list will be made to order. Eight cutters are made for each pitch as by list of Involute Gear Cutters. These cutters are thin enough to cut any bevel gear whose tooth face is not longer than one-third the distance from its outer end to the point where the shaft centre lines meet. In ordering cutters for bevel gears, if the number of teeth in each gear and the pitch are given, also the angle of the shafts, if different from a right angle, can select the proper cutter to send. When an extra length of face is wanted, requiring an especially thin cutter, this length should be specified in the order.

CUTTERS FOR SPIRAL MILLS.

FIG. 892.

We keep in stock a form of Cutter especially adapted to the cutting of spiral mills, either 53° or 40°, one side and 12° on the other, and prefer the 53° angle, except for small and fine-tooth cutters. Right or left-hand cutters are carried in stock.

2½ inches diameter, ½ inch thick, ⅞ inch hole, each, - - - \$2.70

Special shaped cutters of any angle made to order.

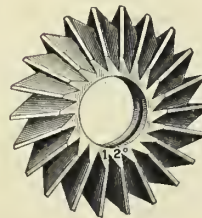
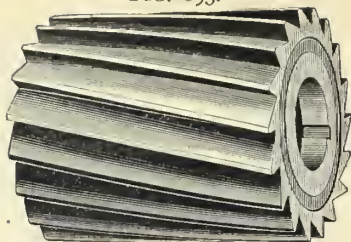


FIG. 893.

**MILLING CUTTERS.**

Cutters not included on list promptly furnished to order, and special attention given to designing gangs of cutters for milling straight, irregular or combined surfaces. Listed cutters of one inch face and over have teeth of a spiral form.

Width of Face. in.	Price of Each Cutter.	Diameter of Cutter. in.	Size of Hole. in.	Width of Face. in.	Price of Each Cutter.	Diameter of Cutter. in.	Size of Hole. in.
I-2	\$1 75	2 I-4	7-8	I I-2	\$4 30	3	I I-4
I	2 50	2 I-4	7-8	I 3-4	4 50	3	I I-4
I 3-4	3 30	2 I-4	7-8	2	4 70	3	I I-4
3-16	I 30	2 I-4	I	2 I-2	5 20	3	I I-4
3-16	I 30	2 I-2	I	3	5 40	3	I I-4
I-4	I 40	2 I-2	I	3 I-2	5 90	3	I I-4
5-16	I 50	2 I-2	I	4	6 40	3	I I-4
3-8	I 60	2 I-2	I	5	7 80	3	I I-4
7-16	I 70	2 I-2	I	6	10 80	3	I I-4
I-2	I 80	2 I-2	I	I-2	3 15	3 I-2	I I-4
9-16	I 90	2 I-2	I	9-16	3 30	3 I-2	I I-4
5-8	2 00	2 I-2	I	5-8	3 45	3 I-2	I I-4
II-16	2 10	2 I-2	I	II-16	3 65	3 I-2	I I-4
3-4	2 20	2 I-2	I	3-4	3 85	3 I-2	I I-4
13-16	2 30	2 I-2	I	7-8	4 35	3 I-2	I I-4
7-8	2 40	2 I-2	I	I	4 75	3 I-2	I I-4
I	2 60	2 I-2	I	I I-4	5 15	3 I-2	I I-4
I I-4	2 90	2 I-2	I	I I-2	5 60	3 I-2	I I-4
I I-2	3 10	2 I-2	I	I 3-4	6 00	3 I-2	I I-4
I 3-4	3 40	2 I-2	I	2	6 40	3 I-2	I I-4
2	3 70	2 I-2	I	2 I-2	6 90	3 I-2	I I-4
2 I-2	4 10	2 I-2	I	3	7 40	3 I-2	I I-4
3	4 50	2 I-2	I	3 I-2	8 15	3 I-2	I I-4
3 I-2	5 00	2 I-2	I	4	9 15	3 I-2	I I-4
4	5 50	2 I-2	I	5	10 40	3 I-2	I I-4
3-8	I 70	2 5-8	I	6	11 90	3 I-2	I I-4
7-16	I 80	2 5-8	I	I-2	3 90	4	I I-4
I-2	I 90	2 3-4	I	9-16	4 10	4	I I-4
9-16	2 00	2 3-4	I	5-8	4 30	4	I I-4
5-8	2 10	2 3-4	I	II-16	4 50	4	I I-4
4	6 00	2 3-4	I I-4	3-4	4 70	4	I I-4
6	10 00	2 3-4	I I-4	7-8	5 15	4	I I-4
II-16	2 20	2 7-8	I	I	5 65	4	I I-4
3-4	2 30	2 7-8	I	I I-4	6 25	4	I I-4
7-8	2 50	2 7-8	I	I I-2	6 65	4	I I-4
3-8	2 10	3	I I-4	I 3-4	7 05	4	I I-4
7-16	2 25	3	I I-4	2	7 45	4	I I-4
I-2	2 40	3	I I-4	2 I-2	8 40	4	I I-4
9-16	2 55	3	I I-4	3	9 00	4	I I-4
5-8	2 70	3	I I-4	3 I-2	10 00	4	I I-4
II-16	2 85	3	I I-4	4	11 00	4	I I-4
3-4	3 00	3	I I-4	5	13 50	4	I I-4
7-8	3 30	3	I I-4	6	15 50	4	I I-4
I	3 60	3	I I-4	3	9 00	4	I I-2
I I-4	4 00	3	I I-4	6	15 50	4	I I-2

FIG. 894.



No. 35.

STEEL STRAIGHT EDGES.

rice, 12 inches long, 1 inch wide, 3-16 inch thick,	-	\$1.25
Price, 18 inches long, 1 1/4 inches wide, 3-16 inch thick,	-	2.00
Price, 24 inches long, 1 1/2 inches wide, 3-16 inch thick,	-	2.75
price, 36 inches long, 2 inches wide, 1/4 inch thick,	-	5.00
price, 48 inches long, 2 1/2 inches wide, 1/4 inch thick,	-	8.00

IMPROVED STOCKING CUTTERS.

We are prepared to furnish Improved Stocking Cutters for gears. By the use of these cutters, the stocking or roughing of gears is greatly facilitated. Table showing depth of space and thickness of tooth in spur wheels, when cut with these cutters.

Pitch of Cutter.	Depth to be Cut in Gear. inches.	Thickness of Tooth at Pitch Line. inches.	Pitch of Cutter.	Depth to be Cut in Gear. inches.	Thickness of Tooth at Pitch Line. inches.
2	1.078	.785	12	.180	.131
2 I-4	.958	.697	14	.154	.112
2 I-2	.863	.628	16	.135	.098
2 3-4	.784	.570	18	.120	.087
3	.719	.523	20	.108	.079
3 I-2	.616	.448	22	.098	.071
4	.539	.393	24	.090	.065
5	.431	.314	26	.083	.060
6	.359	.262	28	.077	.056
7	.308	.224	30	.072	.052
8	.270	.196	32	.067	.049
9	.240	.175	36	.060	.044
10	.216	.157	40	.054	.039
11	.196	.143	48	.045	.033

FIG. 895.

**END MILLS WITH CENTER CUT.**

In ordering state whether right or left hand mills are wanted. These End Mills are useful where it is desired to cut into the work with the end of the mill, and then move along as in cams, grooves, etc., as the teeth are sharp on the inside, and thus cut a path out from the first entering point. They are also useful in taking heavy cuts, especially in cast iron.

Diam. of Mill. in.	Price.	Length of cut, Whole Length. in.	No. of Taper. in.
I-2	\$1 50	I	3 I-8
I-2	I 80	I I-8	5 I-8
9-16	I 70	I	3 I-8
9-16	I 85	I I-4	5 I-4
5-8	I 80	I I-4	3 5-16
5-8	2 10	I I-2	5 3-8
II-16	2 15	I I-2	5 3-8
II-16	2 35	I I-2	6 13-16
3-4	2 25	I 5-8	5 I-2
3-4	2 45	I 5-8	6 15-16
13-16	2 35	I 5-8	5 3-4
13-16	2 50	I 5-8	6 15-16
7-8	2 60	I 3-4	5 7-8
7-8	2 80	I 3-4	7 I-16
15-16	2 60	I 3-4	5 7-8
15-16	2 80	I 3-4	7 I-16
I	2 70	I 7-8	6
I	2 85	I 7-8	7 3-16
I I-16	2 70	I 7-8	6
I I-16	2 95	I 7-8	7 3-16
I I-8	2 80	2	6 I-4
I I-8	3 00	2	7 I-4
I 3-16	2 80	2	6 I-4
I 3-16	3 10	2	7 I-4
I I-4	2 80	2	6 I-4
I I-4	3 20	2	7 I-4
I 5-16	3 45	2 I-8	7 3-8
I 3-8	3 45	2 I-8	7 3-8
I 7-16	3 75	2 I-4	7 I-2
I I-2	3 75	2 I-4	7 I-2

FIG. 896.

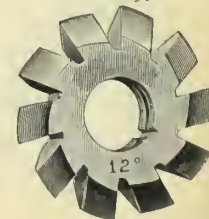
**ANGULAR CUTTERS.**

We keep in stock Angular Cutters of 40°, 45°, 50°, 60°, 70° and 80° angle, right and left hand, suitable for cutting the teeth of ratchet wheels, cutters and mills.

Cutters 2 1/2 inches diameter, 1/2 inch thick, 7/8 inch hole. Each, \$2.70

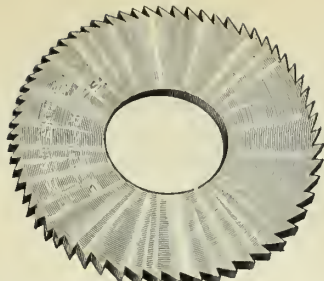
Cutters 2 3/4 inches diameter, 1/2 inch thick, 1 inch hole. Each, \$3.00

FIG. 897.



For cutting the teeth of cutters straight or spiral. These cutters are kept in stock. They can be sharpened without changing their shape by grinding upon the face. Cutters are 2 1/2 inches diameter, 1/2 inch thick, and have 7/8 inch holes. Each, \$3.50

FIG. 898.



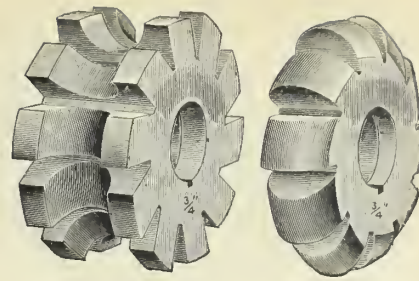
SCREW-SLOTTING CUTTERS.

These Cutters have a fine pitch of teeth especially adapted for the slotting of screw heads and similar work.

Diameter of Screw Head to be Slotted.	Thickness of Cutter by Amer. Standard Wire Gauge.	Price of Each Cutter.	Thickness of Cutter in Decimals.	Diameter of Cutter.	Size of Hole.
in.	No.	\$	in.	in.	in. and I
1-8	8	50	.128	2 3/4	3-4
1-8	9	50	.114	2 3/4	3-4
1-8	10	40	.102	2 3/4	3-4
1-8	11	35	.091	2 3/4	3-4
1-8	12	30	.081	2 3/4	3-4
1-8	13	25	.072	2 3/4	3-4
1-8	14	20	.064	2 3/4	3-4
1-8	15	15	.057	2 3/4	3-4
1-8	16	15	.051	2 3/4	3-4
1-8	17	15	.045	2 3/4	3-4
1-8	18	15	.040	2 3/4	3-4
1-8	19	15	.035	2 3/4	3-4
1-8	20	15	.032	2 3/4	3-4
1-8	21	15	.028	2 3/4	3-4
1-8	22	15	.025	2 3/4	3-4
1-8	23	15	.023	2 3/4	3-4
1-8	24	15	.020	2 3/4	3-4
1-8	25	15	.018	2 3/4	3-4
1-8	26	15	.016	2 3/4	3-4
1-8	27	15	.014	2 3/4	3-4
1-8	28	15	.012	2 3/4	3-4
1-8	30	15	.010	2 3/4	3-4
1-8	32	15	.008	2 3/4	3-4
1-8	34	15	.006	2 3/4	3-4
1-8	14	20	.064	2 3/4	5-8
1-8	15	15	.057	2 3/4	5-8
1-8	16	15	.051	2 3/4	5-8
1-8	17	15	.045	2 3/4	5-8
1-8	18	15	.040	2 3/4	5-8
1-8	19	15	.035	2 3/4	5-8
1-8	20	15	.032	2 3/4	5-8
1-8	21	15	.028	2 3/4	5-8
1-8	22	15	.025	2 3/4	5-8
1-8	23	15	.023	2 3/4	5-8
1-8	24	15	.020	2 3/4	5-8
1-8	25	15	.018	2 3/4	5-8
1-8	26	15	.016	2 3/4	5-8
1-8	27	15	.014	2 3/4	5-8
1-8	28	15	.012	2 3/4	5-8
1-8	30	15	.010	2 3/4	5-8
1-8	32	15	.008	2 3/4	5-8
1-8	34	15	.006	2 3/4	5-8
1-8	20	15	.032	2 3/4	1-2
1-8	21	15	.028	2 3/4	1-2
1-8	22	15	.025	2 3/4	1-2
1-8	23	15	.023	2 3/4	1-2
1-8	24	15	.020	2 3/4	1-2
1-8	25	15	.018	2 3/4	1-2
1-8	26	15	.016	2 3/4	1-2
1-8	27	15	.014	2 3/4	1-2
1-8	28	15	.012	2 3/4	1-2
1-8	30	15	.010	2 3/4	1-2
1-8	32	15	.008	2 3/4	1-2
1-8	34	15	.006	2 3/4	1-2
1-8	20	15	.032	2 1/4	1-2, 5-8, 3-4
1-8	21	15	.028	2 1/4	1-2, 5-8, 3-4
1-8	22	15	.025	2 1/4	1-2, 5-8, 3-4
1-8	23	15	.023	2 1/4	1-2, 5-8, 3-4
1-8	24	15	.020	2 1/4	1-2, 5-8, 3-4
1-8	25	15	.018	2 1/4	1-2, 5-8, 3-4
1-8	26	15	.016	2 1/4	1-2, 5-8, 3-4
1-8	27	15	.014	2 1/4	1-2, 5-8, 3-4
1-8	28	15	.012	2 1/4	1-2, 5-8, 3-4
1-8	30	15	.010	2 1/4	1-2, 5-8, 3-4
1-8	32	15	.008	2 1/4	1-2, 5-8, 3-4
1-8	34	15	.006	2 1/4	1-2, 5-8, 3-4
1-8	20	15	.032	1 3/4	3-8, 1-2, 5-8
1-8	21	15	.028	1 3/4	3-8, 1-2, 5-8
1-8	22	15	.025	1 3/4	3-8, 1-2, 5-8
1-8	23	15	.023	1 3/4	3-8, 1-2, 5-8
1-8	24	15	.020	1 3/4	3-8, 1-2, 5-8
1-8	25	15	.018	1 3/4	3-8, 1-2, 5-8
1-8	26	15	.016	1 3/4	3-8, 1-2, 5-8
1-8	27	15	.014	1 3/4	3-8, 1-2, 5-8
1-8	28	15	.012	1 3/4	3-8, 1-2, 5-8
1-8	30	15	.010	1 3/4	3-8, 1-2, 5-8
1-8	32	15	.008	1 3/4	3-8, 1-2, 5-8
1-8	34	15	.006	1 3/4	3-8, 1-2, 5-8

Cutters varying from the list made to order.

FIG. 899.



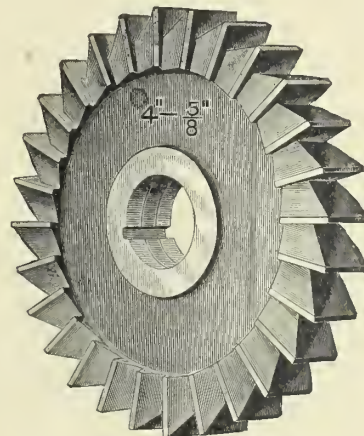
CONCAVE AND CONVEX CUTTERS.

FOR MILLING HALF CIRCLES.

These cutters can be sharpened by grinding without changing their form.

Diameter of Circle.	Diameter of Cutter.	Size of Hole.	Convex Cutter Price.	Concave Cutter Price.
1/8 inch	2 inches	7/8 inch	\$2.00	\$2.40
1/4 inch	2 inches	7/8 inch	2 50	3 00
3/8 inch	2 1/4 inches	7/8 inch	3.10	3.70
1/2 inch	2 1/4 inches	7/8 inch	3 60	4.30
5/8 inch	2 3/4 inches	7/8 inch	4.00	4.80
3/4 inch	2 3/4 inches	7/8 inch	4.40	5.25
7/8 inch	3 1/4 inches	1 inch	4.80	5.75
1 inch	3 1/4 inches	1 inch	5.25	6.30
1 1/8 inches	3 1/2 inches	1 inch	5.75	6.90
1 1/4 inches	3 1/2 inches	1 1/4 inches	6 25	7.50
1 3/8 inches	3 3/4 inches	1 1/4 inches	7.00	8.40
1 1/2 inches	3 3/4 inches	1 1/4 inches	7 75	9.30

FIG. 900.

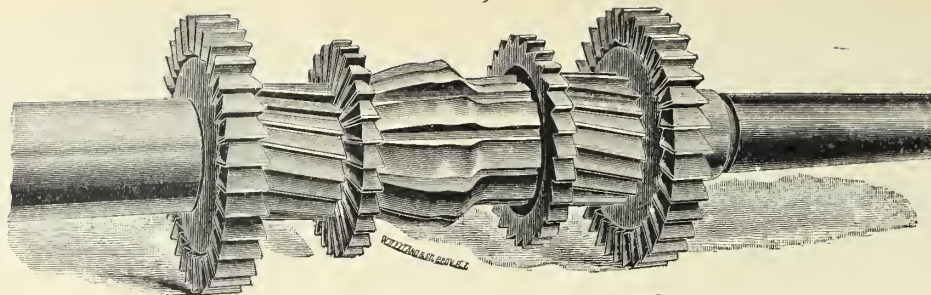


SIDE MILLING CUTTERS.

Diameter.	Width of Face.	Hole.	Price Each.
2 inches	3-16 inch	1/2 inch	\$2.00
2 inches	1/4 inch	1/2 inch	2.05
2 inches	3/8 inch	1/2 inch	2.10
2 inches	3-16 inch	5/8 inch	2.00
2 inches	1/4 inch	5/8 inch	2.05
2 inches	3/8 inch	5/8 inch	2.10
2 1/2 inches	1/4 inch	7/8 inch	2 15
2 1/2 inches	3/8 inch	7/8 inch	2.20
2 1/2 inches	1/2 inch	7/8 inch	2 25
2 3/4 inches	1/4 inch	7/8 inch	2.30
2 3/4 inches	3/8 inch	7/8 inch	2.35
3 inches	1/4 inch	1 inch	2.40
3 inches	3/8 inch	1 inch	2.50
3 inches	1/2 inch	1 inch	2.80
3 1/2 inches	9-16 inch	1 inch	3 50
4 inches	5/8 inch	1 inch	4 70
5 inches	3/4 inch	1 inch	6.00
6 inches	15-16 inch	1 1/4 inches	8 50
6 inches	15-16 inch	1 1/2 inches	8 50
7 inches	1 1/8 inches	1 1/4 inches	17 00
8 inches	1 3/8 inches	1 1/4 inches	23 00
8 inches	1 3/8 inches	1 1/2 inches	23 00

Cutters varying from the above list are made to order.

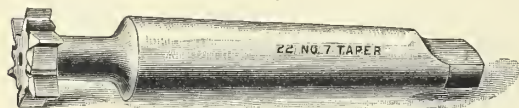
FIG. 901.



GANGS OF MILLING CUTTERS.

Standard and special cutters accurately assembled for milling any required outline.
Gears cut with these cutters will work with gears cut in accordance with the Brown & Sharpe system.

FIG. 902.



STANDARD T SLOT CUTTERS.

LEFT HAND CUTTER.

No of Cutter.	Thickness of Cutter. Inch.	Diameter of Cutter. Inch.	Diameter of Neck of Cutter. Inch.	Length of Neck. Inch.	No. of Taper.	Price.
4	5-32	1/2	7-32	1/4	4	\$1 50
7	5-32	1/2	7-32	1/4	5	1 60
10	5-32	5/8	9-32	5-16	5	1 80
13	5-32	5/8	9-32	5-16	7	2 10
16	7-32	11-16	11-32	3/8	5	2 00
19	7-32	11-16	11-32	3/8	7	2 20
22	7-32	13-16	3/8	7-16	7	2 35
25	7-32	13-16	3/8	7-16	9	2 50
28	9-32	15-16	7-16	1/2	7	2 60
31	9-32	15-16	7-16	1/2	9	2 80
34	13-32	1 3-16	17-32	5/8	9	3 10
37	17-32	1 5-16	21-32	15-16	9	3 45

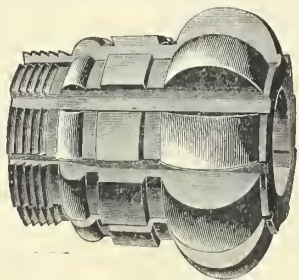
The cutters are made 1-32 inch larger in diameter than the figures given, to allow for sharpening.

Other sizes and right-hand cutters made to order.

A desirable milling cutter is made of fine steel, is well designed, well finished, and accurate in all its relative dimensions.

A cutter having 32 teeth making 40 turns per minute will mill a surface at the rate of 1-16 inch to one turn of the cutter, or 2 1/2 inches a minute. If arbor or cutter were inaccurate, it would be necessary to reduce the feed, resulting in a corresponding reduction of products.

FIG. 903.



FORMED MILLING CUTTERS.

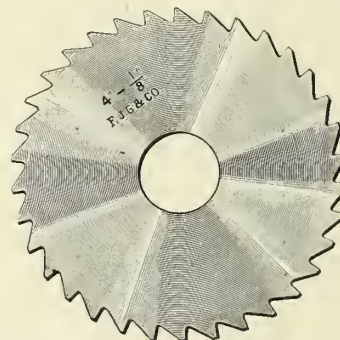
FOR MILLING PARTS OF MACHINERY.

These cutters can be made in a great variety of outlines, and can be sharpened by grinding without changing their form. They are economical in the production of duplicate and interchangeable parts.

In ordering send sketch of, or sample piece to be milled, with size of hole required, and indicate the direction cutter is to revolve.

Exact duplicate cutters can be made at any time. This is of great importance when accuracy in duplication of machine parts is required.

FIG. 904.

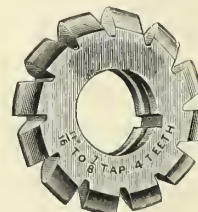


METAL SLITTING SAWS.

These are thin milling cutters with the sides accurately ground concave for clearance, and are hardened to cut metals.

In ordering special saws, please state for what purpose they are required.

Diameter, Inches.	Thickness, Inches.	Hole, Inches.	Price.
2 1-2	1-32	7-8	\$1 00
2 1-2	3-64	7-8	1 00
2 1-2	1-16	7-8	90
2 1-2	3-32	7-8	90
2 1-2	1-8	7-8	90
3	1-32	1	1 25
3	3-64	1	1 10
3	1-16	1	1 00
3	3-32	1	1 00
3	1-8	1	1 00
4	3 64	1	1 45
4	1-16	1	1 25
4	3-32	1	1 20
4	1-8	1	1 20
5	1-16	1	1 80
5	3-32	1	1 60
5	1-8	1	1 50
5	1-8	1 1-4	1 50
5	1-8	1 1-2	1 50
6	1-8	1	2 70
6	3 16	1 1-2	3 50
7	1-8	1	3 80



TAP AND REAMER CUTTERS.

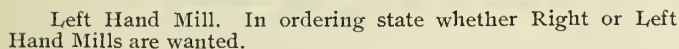
FIG. 905.

These cutters are adapted for fluting reamers, for which purpose it is only necessary to cut one or more grooves of a less depth in order to produce the flutes unequal distances apart.

No. of Cut-ter.	No. of Teeth in Reamer.	No. of Teeth in Tap.	Diameter of Reamer. Inches.	Diameter of Tap. Inches.	Diameter of Cutter. Inches.	Hole of Cutter. Inches.	Price of each Cutter.
1	6	4	1-8 to 1-4	0 to 1-8	1 3-4	7-8	\$2 00
2	6	4	9-32 to 3-8	5-32 to 1-4	1 3-4	7-8	2 10
3	6	4	13-32 to 1-2	9-32 to 3-8	1 7-8	7-8	2 20
4	6 to 8	4	17-32 to 1 1-8	7-16 to 5-8	2	7-8	2 40
5	8 to 10	4	1 5-32 to 1 3-4	11-16 to 7-8	2 1-8	7-8	2 70
6	10	4	1 25-32 to 2	15-16 to 1 1-4	2 1-4	7-8	3 00
7		4		1 5-16 to 1 5-8	2 3-8	7-8	3 30
8		4		1 11-16 to 2	2 5-8	7-8	3 60

These Cutters can be sharpened without changing their form.

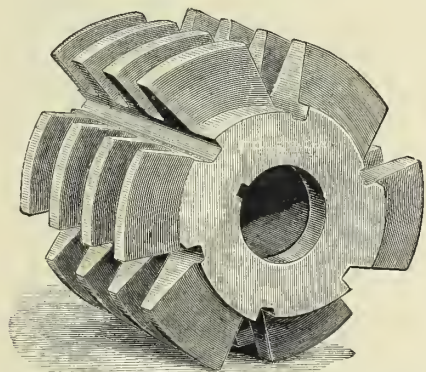
FIG. 906.



Diameter of Mill, Inches.	Price.	Length of Cut, Inches	Whole Length, Inches.	No. of Taper.
1-4	\$1 00	13-16	2 7-16	4
1-4	1 15	13-16	3	5
5-16	1 00	7-8	2 7-16	4
5-16	1 15	7-8	3 1-16	5
3-8	1 10	7-8	2 7-16	4
3-8	1 20	7-8	3 1-16	5
7-16	1 10	15-16	2 1-2	4
7-16	1 25	15-16	3 1-8	5
1-2	1 30	1	3 1-8	5
1-2	1 45	1 1-8	5 1-8	7
9-16	1 35	1	3 1-8	5
9-16	1 50	1 1-4	5 1-4	7
5-8	1 45	1 1-4	3 5-16	5
5-8	1 70	1 1-2	5 3-8	7
11-16	1 75	1 1-2	5 3-8	7
11-16	1 90	1 1-2	6 13-16	9
3-4	1 80	1 5-8	5 1-2	7
3-4	1 95	1 5-8	6 15-16	9
13-16	1 90	1 5-8	5 3-4	7
13-16	2 00	1 5-8	6 15-16	9
7-8	2 10	1 3-4	5 7-8	7
7-8	2 25	1 3-4	7 1-16	9
15-16	2 10	1 3-4	5 7-8	7
15-16	2 25	1 3-4	7 1-16	9
1	2 15	1 7-8	6	7
1	2 30	1 7-8	7 3-16	9
1 1-16	2 15	1 7-8	6	7
1 1-16	2 35	1 7-8	7 3-16	9
1 1-8	2 25	2	6 1-4	7
1 1-8	2 40	2	7 1-4	9
1 3-16	2 25	2	6 1-4	7
1 3-16	2 50	2	7 1-4	9
1 1-4	2 25	2	6 1-4	7
1 1-4	2 55	2	7 1-4	9
1 5-16	2 75	2 1-8	7 3-8	9
1 3-8	2 75	2 1-8	7 3-8	9
1 7-16	3 00	2 1-4	7 1-2	9
1 1-2	3 00	2 1-4	7 1-2	9

Special End Mills, Hollow, Counterboring, or any special Mills in this class made to order.

FIG. 907.

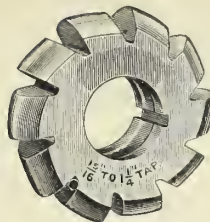


We are prepared, by the use of special machinery, to make Worm Hobs of any size, the teeth of which can be ground on their faces without changing their form.

By our method of relieving the Hobs they cut as freely as milling cutters.

In ordering Hobs state the lead; *i. e.*, the advance in one turn, the turns per inch, whether the thread is single, double, etc., right or left handed, size of hole, size of keyway, diameter of worm and diameter of worm wheel.

FIG. 908.

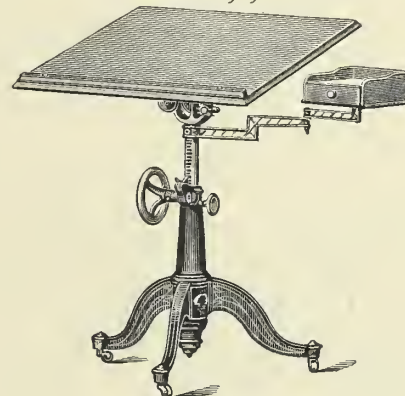


These cutters do not make as deep a groove in proportion to the width as the Tap and Reamer Cutters. They are not suitable for fluting reamers.

These cutters can be sharpened by grinding without changing their form. In ordering, give number of Cutter or diameter of Tap as by following list.

Number of Cutter.	Price of Each Cutter.	Diameter of Taps. Inches.	Diameter of Cutter. Inches.	Hole in Cutter. Inches.
1	\$2 00	0 to 1-8	1 3-4	7-8
2	2 10	5-32 to 1-4	1 3-4	7-8
3	2 20	9-32 to 3-8	1 7-8	7-8
4	2 40	7-16 to 5-8	2	7-8
5	2 70	11-16 to 7-8	2 1-8	7-8
6	3 00	15-16 to 1 1-5	2 1-4	7-8
7	3 30	1 5-16 to 1 5-8	2 3-8	7-8
8	3 60	1 11-16 to 2	2 5-8	7-8

FIG. 909.



No. 53.

DRAWING TABLE.

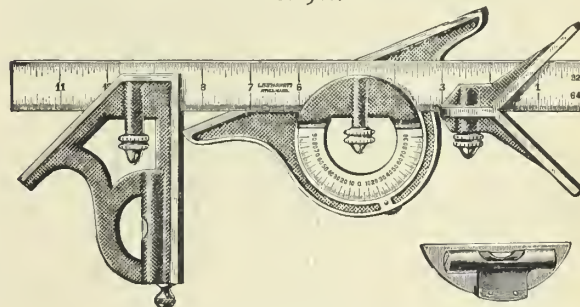
Drawing Table, black walnut or cherry top, 24 x 27 inches, folding arm with drawer and shelf, enameled and neatly ornamented, \$16.

Drawing Table, black walnut or cherry top, 24 x 27 inches, highly polished and nickel plated wheels, enameled stand with folding arm drawer and shelf, \$20.

The above with foot rest, \$21.

The above with foot rest, shelf and rack for easel, \$23.

FIG. 910.



No. 9.

COMBINATION SET.

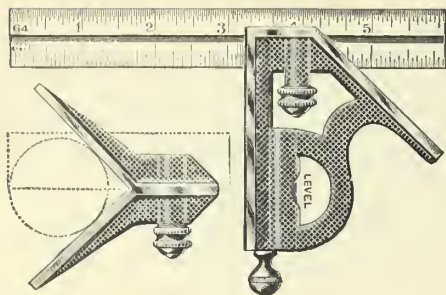
9 inch set complete,	-	-	-	-	-	-	-	\$4.50
12 " " "	-	-	-	-	-	-	-	5.00
18 " " "	-	-	-	-	-	-	-	5.75
24 " " "	-	-	-	-	-	-	-	6.25

No. 8.

SPECIAL STANDARD SQUARE.

18 in., blade	$\frac{9}{16}$ in.	wide by	$\frac{1}{10}$ in.	thick,	8 $\frac{1}{4}$ in.	stock,	-	\$6.00
24 " "	" "	" "	" "	" "	" "	" "	-	7.00

FIG. 911.



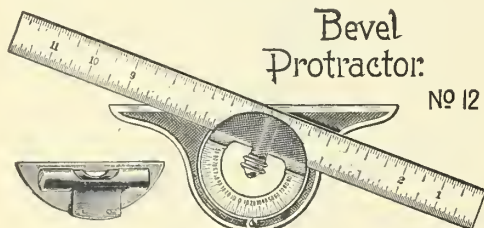
No. 11.

PATENT COMBINATION SQUARE.

4 in.,	without center head or level,	-	-	-	-	\$1.00
6 "	with center head,	-	-	-	-	\$2.00, without, 1.50
9 "	" " " "	-	-	-	-	2.50, " 1.75
12 "	" " " "	-	-	-	-	3.00, " 2.25
18 "	" " " "	-	-	-	-	3.75, " 3.00
24 "	" " " "	-	-	-	-	4.25, " 3.50

The 6, 9, 12, 18 and 24 inch have levels and center heads, and will be sent complete unless otherwise ordered. The 18 and 24 inch have same stock as 12 inch.

FIG. 912.

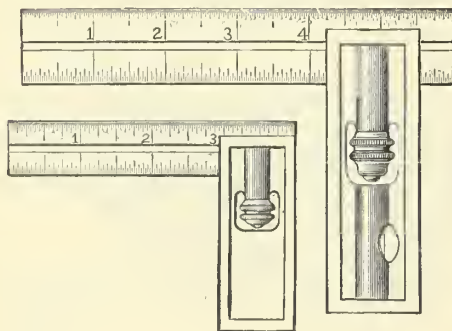


No. 12.

IMPROVED BEVEL PROTRACTOR.

Protractor Head only,	-	-	-	-	-	\$2.00
" " with 12 in. blade,	-	-	-	-	-	3.00
" " " 18 in. "	-	-	-	-	-	3.75
" " " 24 in. "	-	-	-	-	-	4.75

FIG. 913.



No. 13.

PATENT DOUBLE SQUARE.

The seat against which the blade is clamped being convex, should corners of the blade get injured, the accuracy of the square is not affected. 4 sizes. Warranted accurate.

Price, 4 inch,	-	-	-	-	-	\$1.25, with both blades, \$1.65
" 6 "	-	-	-	-	-	2.00, " " " 2.50
" 9 "	-	-	-	-	-	3.00
" 12 "	-	-	-	-	-	4.00

Both blades with 4 and 6 inch always sent unless otherwise ordered.

FIG. 914.

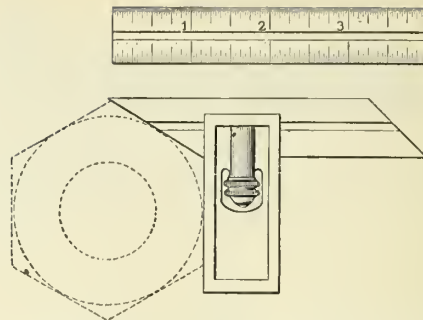
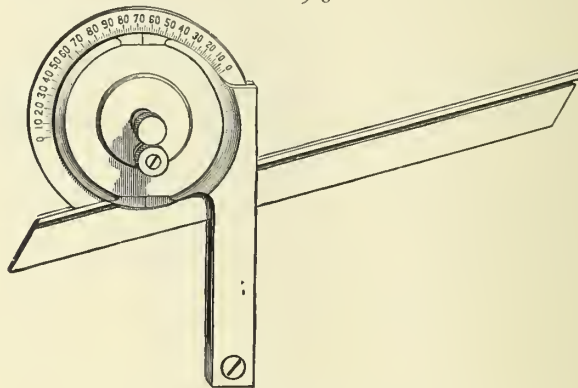


FIG. 915.

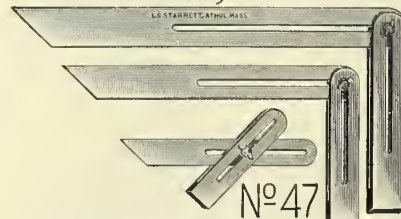


No. 360.

UNIVERSAL BEVEL PROTRACTOR.

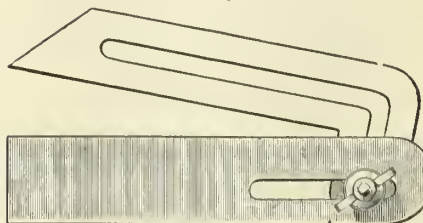
Price, with 7 inch blade,	-	-	-	-	-	\$5.00
" " 12 " " "	-	-	-	-	-	6.00
" 7 inch, with morocco case,	-	-	-	-	-	5.75
" 12 " " " "	-	-	-	-	-	7.00

FIG. 916.

**IMPROVED BEVEL.**

6 inch,	-	-	-	-	-	\$1.25
9 "	-	-	-	-	-	1.50
12 "	-	-	-	-	-	1.75

FIG. 917.



No. 15.

UNIVERSAL BEVEL.

Price,	-	-	-	-	-	\$1.50
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A technical drawing of a vernier caliper. The drawing shows the main body and the sliding jaw. Four parts are numbered: 1 points to the main beam, 2 points to the sliding jaw, 3 points to the vernier scale, and 4 points to the main scale. The drawing is a side view showing the internal mechanism and the scales.

MICROMETER CALIPER SQUARE.

FIG. 919.



N^o 21
THIN STEEL TRY SQUARES.

The 2 inch and 3 inch are divided into 16ths and 64ths on one side, and into 32nds and 64ths on the other. The 4 inch and 6 inch are divided on both sides into 16ths and 32nds.

PATENT INCLINOMETER.

With 12 inch blade,	-	-	-	-	-	-	-	\$5.00
" 18 " "	-	-	-	-	-	-	-	6.00
" 24 " "	-	-	-	-	-	-	-	7.00

SCRATCH GAUGE.

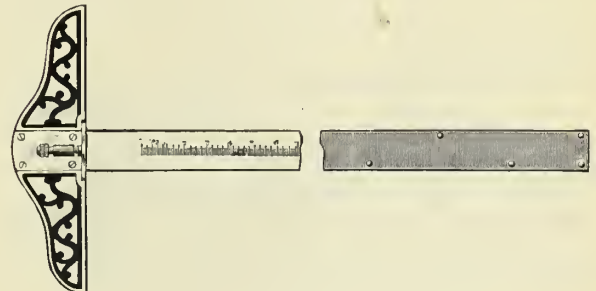
Unless otherwise ordered, we shall send those graduated in 64ths. Two extra cutters will be sent with each gauge, fastened to the base. They should last for years.

A photograph of a metal tool, possibly a gauge or a small saw, with a ruler placed horizontally above it for scale. The ruler is marked in inches from 1 to 5. The tool has a long, thin, rectangular head and a handle with a circular hole and a slot.

BLADE WITH HARDENED EDGE, GRADUATED.

BLADE WITH HARDENED EDGE, NOT GRADUATED.

GRADUATED BLADE, NOT HARDENED.

FIG. 923.

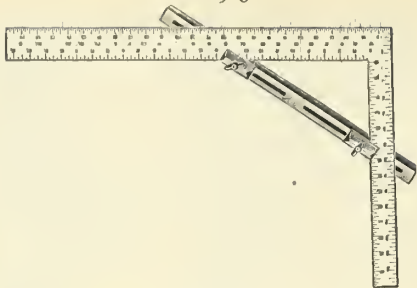
IMPROVED T SQUARE.

FIG. 924.

SURFACE GAUGE ATTACHMENT.

Price of the auxiliary arbor, 50 cents. Complete, \$1.50.

FIG. 925.



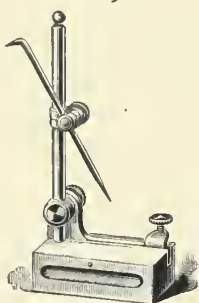
No. 110.

PATENT STAIR GAUGE.

Plain, 18 inch, nickel plated	-	-	-	\$1.00
Plain, 28 inch, nickel plated	-	-	-	1.50
Graduated, 18 inch, nickel plated	-	-	-	1.50
Graduated, 28 inch, nickel plated	-	-	-	2.25

Sent plain unless otherwise ordered.

FIG. 926.

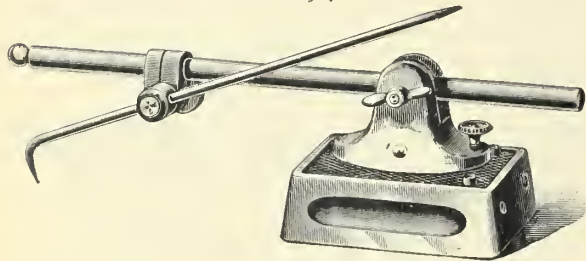


No. 56.

TOOL MAKERS' UNIVERSAL SURFACE GAUGE.

Price, - - - - - \$3.00

FIG. 927.



No. 55.

UNIVERSAL SURFACE GAUGE.

Price, 9 inch,	-	-	-	-	\$2.50
Price, 12 inch,	-	-	-	-	3.00
Price, with two spindles 12 and 18 inches,	-	-	-	-	3.50

Extra spindles of any length furnished at rate of 3 cents an inch.

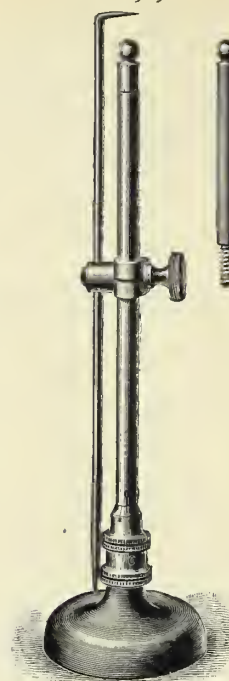
FIG. 928.

ADJUSTABLE CALIPER GAUGE No.125

CUT FULL SIZE OF 3 INCH.
 3 INCH PRICE. \$1.00
 6 " " 1.25

3 inch with 2 rods, capacity from 3 inch to 6 3/4 inch, - \$1.00
 6 inch with 3 rods, capacity from 6 inch to 16 inch, - 1.25
 The diameter of the steel rods is .150 inch. Extra rods furnished at 1 cent per inch.

FIG. 929.



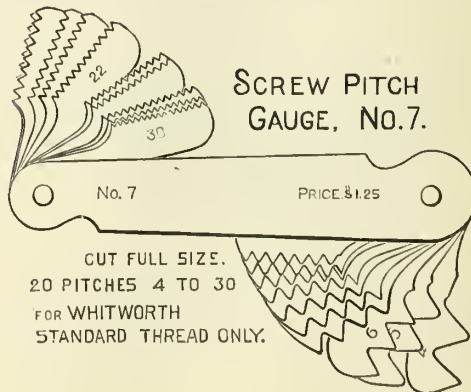
No. 53.

MICROMETER SURFACE GAUGE.

8 inch, without extension	-	-	-	\$2.50
12 inch, without extension	-	-	-	3.50
12 inch, with extension	-	-	-	4.00

In ordering, give the size wanted.

FIG. 930.

WHITWORTH**SCREW PITCH GAUGE, NO.7.**

No. 7

PRICE \$1.25

CUT FULL SIZE.
 20 PITCHES 4 TO 30
 FOR WHITWORTH
 STANDARD THREAD ONLY.

Has the following pitches: 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 25, 26, 27, 28, 30.

Price, - - - - - \$1.25

SCREW PITCH GAUGE.

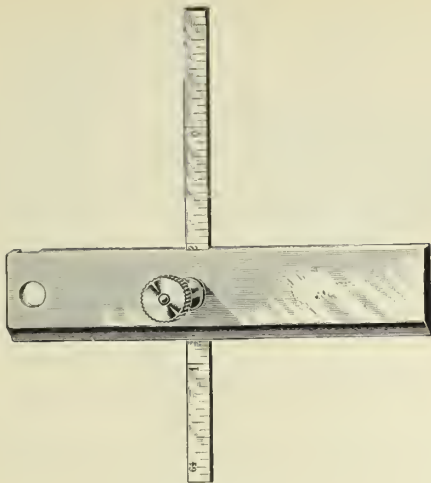
No. 5.

26 PITCHES, 32 TO 82.

Of the same form as No. 40 Screw Pitch Gauge, for inside and outside work. Has the following pitches: 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82.

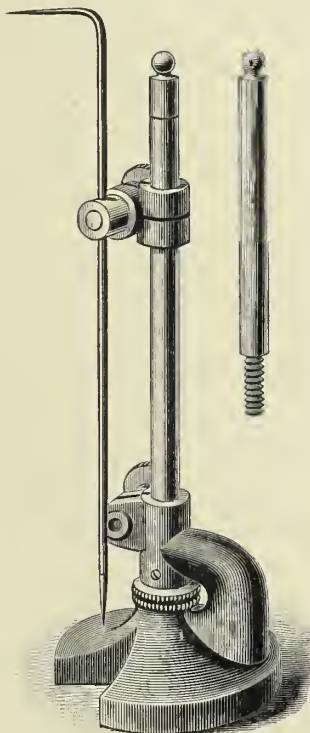
Price, - - - - - \$1.25

FIG. 931.

No. 46.
DEPTH GAUGE.

Price, - - - - \$1.25.

FIG. 932.

No. 52.
SURFACE GAUGE.

8 inch,	- - - - -	\$2.00
12 inch,	- - - - -	2.75
12 inch, with 6 inch extension	- - - - -	3.25

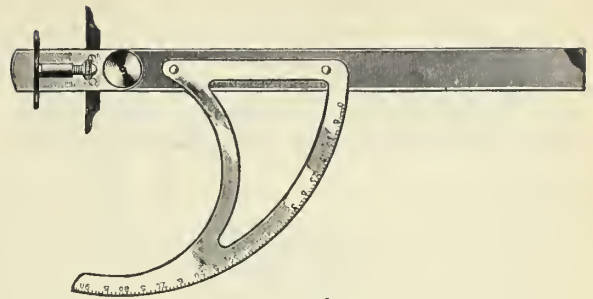
SCREW PITCH GAUGE.

No. 11½.

For pipe and brass work. This Gauge is the same as No. 40, except that pitches 8, 11½ and 27 are substituted in place of 36, 38, and 40.

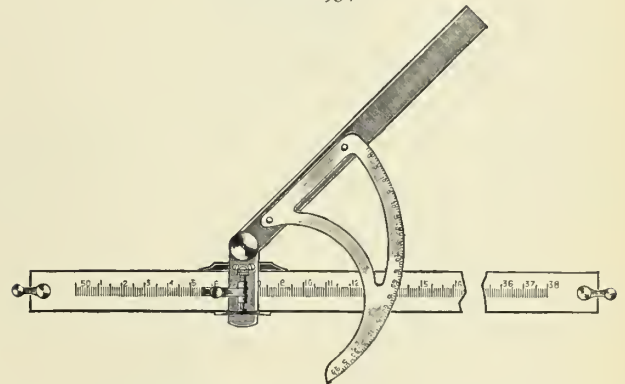
Price, - - - - - \$1.00

FIG. 933.



No. 165.

FIG. 934.



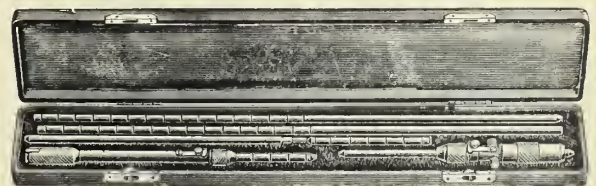
No. 165½.

PROTRACTORS.

Protractor only,	- -	\$5.00
Jointed blade, 15 inch,	- -	5.00, with protractor, \$10.00
Jointed blade, 24 inch,	- -	6.00, with protractor, 11.00
Jointed blade, 36 inch,	- -	7.00, with protractor, 12.00
With section liner,	- -	3.00 extra.

Long auxiliary blades for interchangeable use, with clasp, are supplied. Price, 24 inch, \$2.00; 36 inch, \$2.50.

FIG. 935.



No. 120.

INSIDE MICROMETER.

Micrometer with 3 rods covering lengths from 4 inches to 11½ inches, with case,	- - - - -	\$6.00
With extension sleeve and 5 rods covering lengths from four inches to 30 inches, with case,	- - - - -	10.00

FIG. 936.



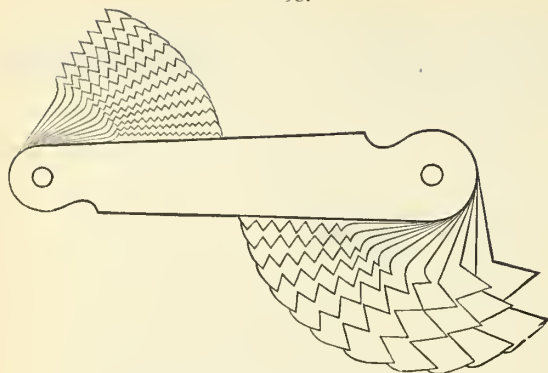
No. 32.

CENTER GAUGES.

Price, - - \$0.25 Spring tempered - - \$0.40

Those not tempered will be sent, unless otherwise ordered.

FIG. 937.



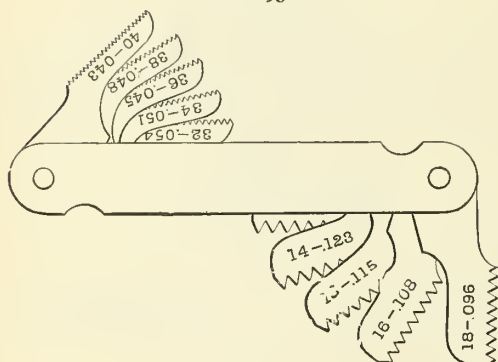
No. 4.

SCREW PITCH GAUGE.

24 PITCHES, 4 TO 30. CUT FULL SIZE.

Price, - - - - - \$1.25

FIG. 938.



No. 40.

IMPROVED SCREW PITCH GAUGE.

Price, - - - - - \$1.00

SCREW PITCH GAUGE.

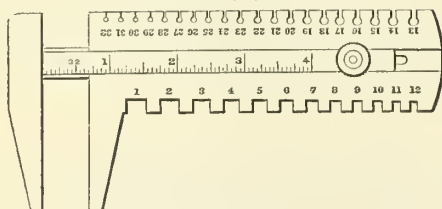
No. 6.

30 PITCHES, 4 TO 42.

Of the same form as my No. 4 Screw Pitch Gauge. Has the following pitches: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42.

Price, - - - - - \$1.50

FIG. 939.



No. 728.

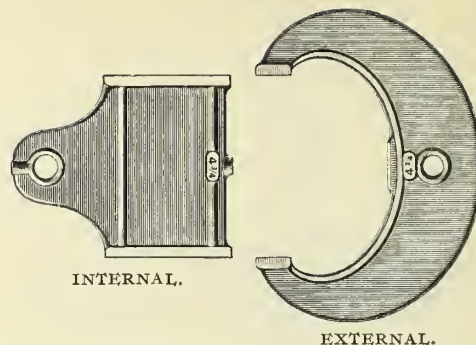
WIRE GAUGE AND CALIPER.

TONGUE GRADUATED ON BOTH SIDES.

For store use in selecting iron, steel and sheet stock; also for iron and steel rollers' use.

Price, - - - - - \$7.00

FIG. 940.

**STANDARD CALIPER GAUGES.**

For convenience in using we make the Standard Caliper Gauges from 3 to 7 inches in two parts for each size—one part for inside measurement and the other for outside measurement.

These gauges are hardened and accurately ground. Gauge Circular, with prices, sent on application.

FIG. 941.

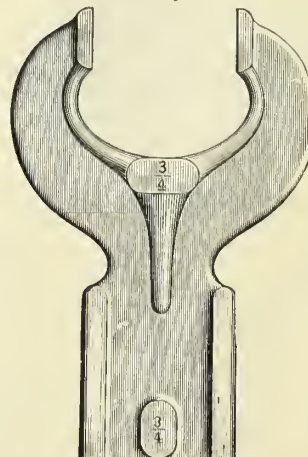
**AMERICAN STANDARD WIRE GAUGE.**

No. 730, sizes 0 to 36, - - - - - \$2.50

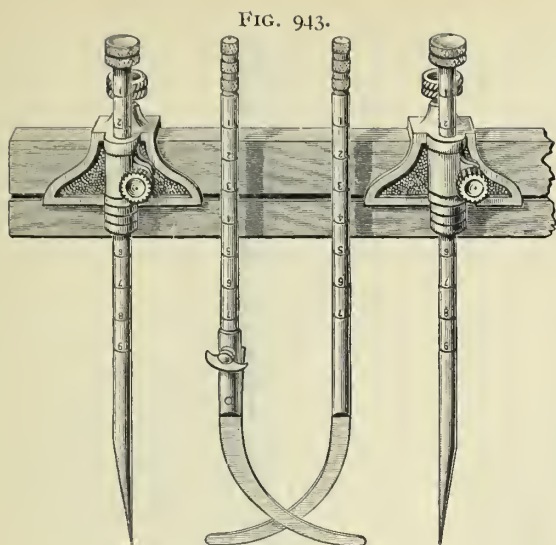
No. 732, sizes 5 to 36, - - - - - 2.00

In order to familiarize the users of the gauge with the decimal equivalents of the gauge numbers, we furnish No. 732 with these decimal equivalents, expressed in thousandths, stamped on the back, opposite to the regular gauge numbers.

FIG. 942.

**STANDARD CALIPER GAUGES.**

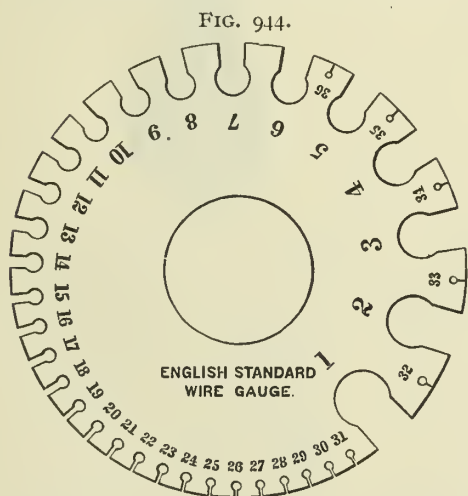
Gauge Circular, with prices, sent on application.



No. 51.

EXTENSION BEAM TRAMMELS.

Price, complete, - - - - - \$3.35
 Price, without caliper legs, - - - - - 2.50
 Sent complete unless otherwise ordered.



ENGLISH STANDARD WIRE GAUGE.

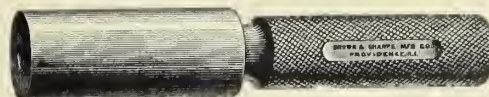
The same as Stub's Wire, or Birmingham Gauge.

No. 734, sizes 1 to 36, - - - - - \$2.00
 No. 736, sizes 6 to 36, - - - - - 1.50

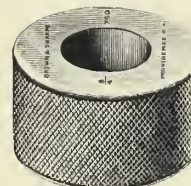
Sizes of the numbers of English Standard Wire Gauge.

No. of Wire Gauge.	Size of each No. in dec. parts of an inch.	No. of Wire Gauge	Size of each No. in dec. parts of an inch.	No. of Wire Gauge.	Size of each No. in dec. parts of an inch.
0000	.454	11	.120	25	.020
000	.425	12	.109	26	.018
00	.380	13	.095	27	.016
0	.340	14	.083	28	.014
1	.300	15	.072	29	.013
2	.284	16	.065	30	.012
3	.259	17	.058	31	.010
4	.238	18	.049	32	.009
5	.220	19	.042	33	.008
6	.203	20	.035	34	.007
7	.180	21	.032	35	.005
8	.165	22	.028	36	.004
9	.148	23	.025		
10	.134	24	.022		

FIG. 945.
INTERNAL.



EXTERNAL.

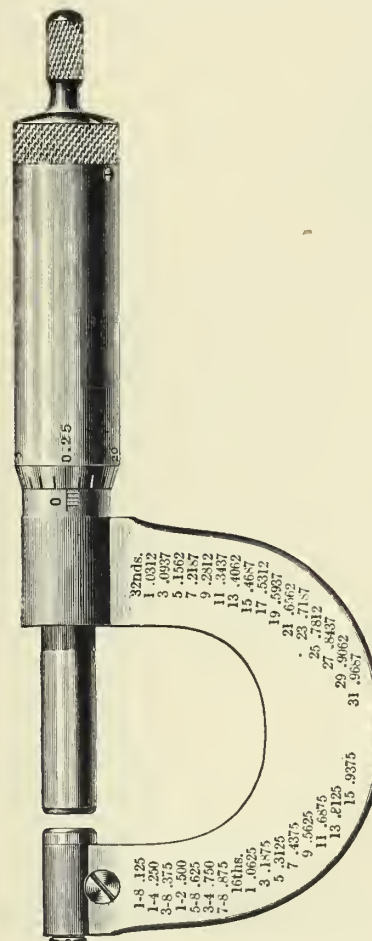


STANDARD INTERNAL AND EXTERNAL CYLINDRICAL GAUGES.

These Standard Internal Cylindrical Gauges, or Plugs, and Standard External Cylindrical Gauges, or Rings, are made in the most careful manner, and furnish gauges for accurate measurements.

These gauges are furnished singly, of any desired size, and are also furnished in regular sets containing sizes from $\frac{1}{4}$ inch to 2 inches, inclusive, varying by sixteenths of an inch.

FIG. 946.



No. 3.

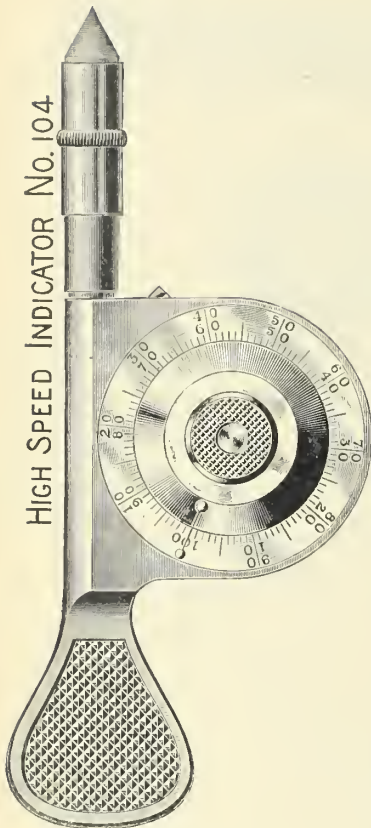
SPEEDED SCREW MICROMETER.

Price, - - - - - \$6.00
 With morocco case, - - - - - 6.50
 Sent with case, unless otherwise ordered.

FIG. 948.

FIG. 949.

FIG. 947.



No. 104.

HIGH SPEED INDICATOR.

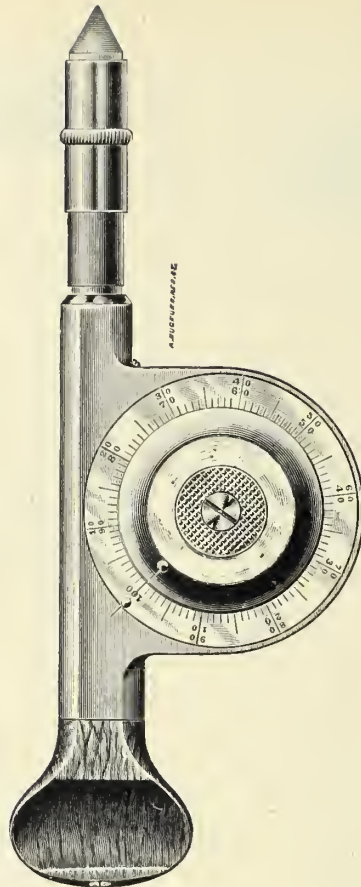
This Indicator may be run at highest speed required without heating, and this on account of frictionless bearing against which the inner end of the spindle revolves (for which patent is pending).

The working parts of this instrument are encased, and the dial plate has two rows of figures, reading right or left, as the shaft may run.

The inner plate is frictionally clamped to the revolving gear by a checked wafer head screw. By a pressure and twist with the thumb the plate is loosened when the O mark may be instantly moved to agree with the starting point, thus saving time revolving the spindle to bring it there.

Price, - - - - - \$1.00
Leatherette case, extra, - - - .50

The Indicator in pasteboard box (list \$1.00) will be sent unless otherwise ordered.

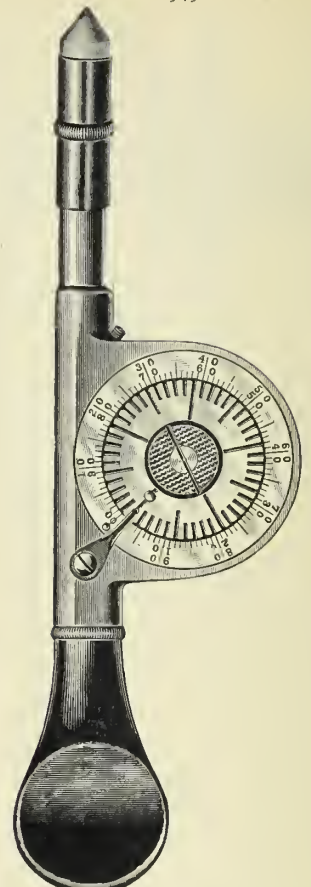


No. 106.

IMPROVED SPEED INDICATOR.

This instrument was devised to automatically register hundreds as well as units and tens; also to furnish a registering indicator at a more reasonable cost. The instrument will register 5000 revolutions. The large dial is graduated into one hundred lines, each one representing a revolution of the spindle. The small dial has fifty lines cut upon its face, each representing one hundred revolutions of the spindle, (or one complete turn of the large dial). A spring finger trip attached to the case engages with one of the lines in the small dial and holds it from revolving until the large dial makes one complete turn, when the trip pin passing under the spring trip lifts it, and the dial is frictionally carried along by the large plate one line, thus showing that one hundred revolutions of the spindle have been made. The instrument has a hard rubber handle, making a safe insulator when used on electrical machinery.

Price, in pasteboard box, - - - \$3.00
Leatherette case, extra, - - - .50



No. 107.

REGISTERING SPEED INDICATOR.

This is a nicely made and finely working Indicator. The working parts are enclosed like a watch, and as well made. The graduations show every revolution, and with two rows of figures read both right and left as the shaft may run. While looking on the watch each hundred revolutions may be counted by allowing the oval headed pin on the revolving disc to pass under the thumb as the instrument is pressed to its work.

The dial is locked to a revolving stud—a slight thumb pressure and twist on the knurled eccentric releases it so that the indicator mark may be readily moved and locked to agree with the starting point, thus saving the necessity of turning the instrument to bring it there.

The instrument is nickel plated, and has a rosewood handle, so that it will not heat the fingers when run at high speed.

Every indicator is warranted first class.

Price, in pasteboard box, - - - \$1.50
Leatherette case, extra, - - - .50

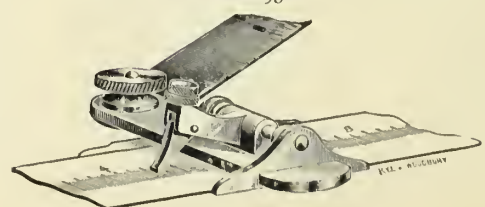
FIG. 950.



No. 105.

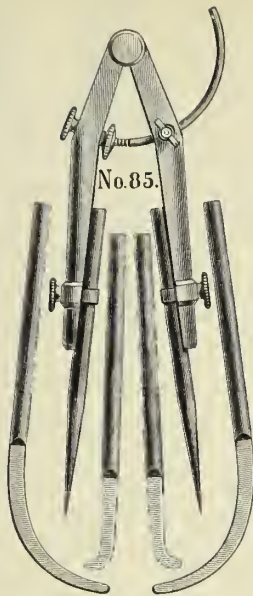
PATENT KEY-SEAT RULE.

6 inches,	- - - - -	\$2.25
6 inches, with auxiliary straight edge, plain,	- - - - -	2.75
6 inches, with auxiliary straight edge, graduated,	- - - - -	3.00
9 inches,	- - - - -	3.00
9 inches, with auxiliary straight edge, plain,	- - - - -	3.75
9 inches, with auxiliary straight edge, graduated,	- - - - -	4.25

**SECTION LINER.**

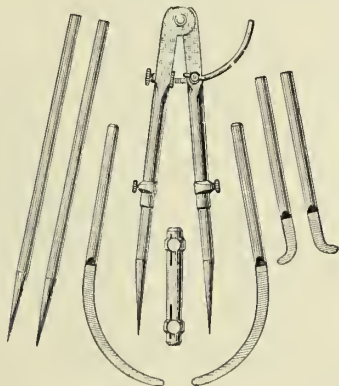
Price, - - - - - \$3.00

FIG. 952.

**IMPROVED EXTENSION DIVIDER.**

7 inch, with divider legs only,	-	-	-	\$1.25
9 inch, with divider legs only,	-	-	-	1.50
7 inch, complete,	-	-	-	2.25
9 inch, complete,	-	-	-	2.50

FIG. 953.



No. 90.

IMPROVED BRONZE DIVIDER.

Price, with points only,	-	-	-	\$2.25
Price, set complete,	-	-	-	4.00

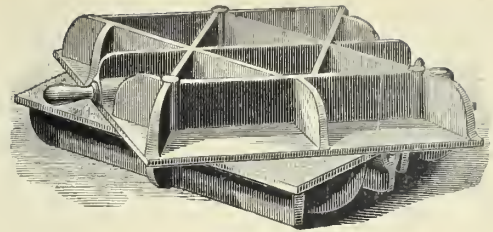
Sent complete unless otherwise ordered.

FIG. 954.

**CAST IRON STRAIGHT EDGES.**

Size.	Price.	Weight
18 by 1½ inches	\$7.00	5 pounds
24 by 1¾ inches	9.50	8 pounds
30 by 1¾ inches	12.00	13 pounds
36 by 1¾ inches	15.00	17 pounds
48 by 2 inches	20.50	35 pounds
60 by 2½ inches	26.50	48 pounds
72 by 2¼ inches	33.00	72 pounds
96 by 2¾ inches	39.00	145 pounds
120 by 2½ inches	50.00	195 pounds

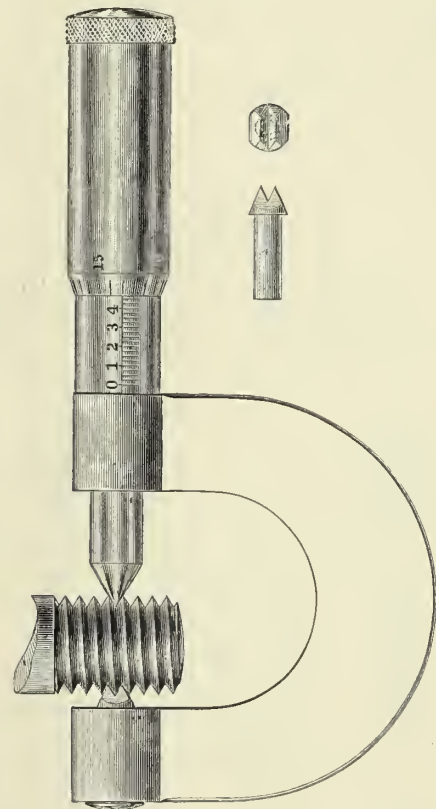
FIG. 955.

**STANDARD CAST-IRON SURFACE PLATES.**

3½ by 12 inches	11 pounds	12 by 24 inches	100 pounds
4 by 15 inches	16 pounds	14 by 14 inches	47 pounds
4½ by 6 inches	5 pounds	14 by 18 inches	62 pounds
5 by 16 inches	21 pounds	14 by 21 inches	93 pounds
6 by 6 inches	7 pounds	15 by 30 inches	139 pounds
6 by 12 inches	19 pounds	16 by 16 inches	62 pounds
6 by 50 inches	120 pounds	18 by 18 inches	65 pounds
6½ by 18 inches	30 pounds	18 by 24 inches	128 pounds
7 by 7½ inches	11 pounds	18 by 36 inches	228 pounds
7 by 10 inches	15 pounds	20 by 30 inches	178 pounds
8 by 12 inches	21 pounds	22 by 80 inches	752 pounds
9 by 9 inches	16 pounds	24 by 24 inches	164 pounds
9 by 14 inches	27 pounds	24 by 36 inches	298 pounds
10 by 15 inches	35 pounds	24 by 48 inches	442 pounds
10 by 30 inches	99 pounds	24 by 60 inches	666 pounds
12 by 12 inches	29 pounds	36 by 68 inches	1024 pounds
12 by 18 inches	53 pounds		

Other sizes made to order.

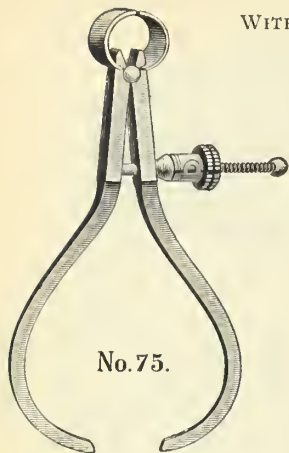
FIG. 956.

**SCREW THREAD MICROMETER CALIPER.**

The Caliper is made in two sizes, 1 and 2 inches.
Prices furnished on application.

OUTSIDE AND INSIDE CALIPERS,

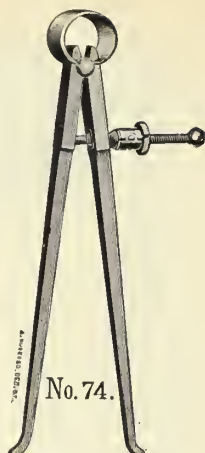
WITH SPRING NUT.



No. 75.

OUTSIDE, No. 75.

	Solid Nut.	Spring Nut.
2 1/2 inches,	\$1.00	\$1.15
3 inches,	1.00	1.15
4 inches,	1.10	1.25
5 inches,	1.10	1.25
6 inches,	1.35	1.50



No. 74.

INSIDE, No. 74.

	Solid Nut.	Spring Nut.
3 inches,	\$1.00	\$1.15
4 inches,	1.10	1.25
5 inches,	1.10	1.25
6 inches,	1.35	1.50

These Calipers will be sent with spring nuts unless otherwise ordered.

HERMAPHRODITE CALIPERS.

No. 42.

With lock joint and sensitive adjustment.

Price, 4 inches,	-	-	\$0.90
Price, 6 inches,	-	-	1.00
Price, 8 inches,	-	-	1.25
Price, 10 inches,	-	-	1.50

NEW DIVIDERS.

No. 43.

Price, 6 inches,	-	-	\$1.00
Price, 8 inches,	-	-	1.25
Price, 10 inches,	-	-	1.50



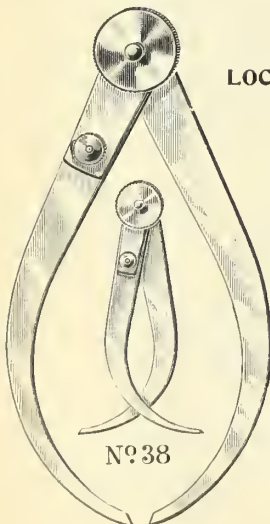
No. 42



No. 43

LOCK-JOINT CALIPERS.

4 inches,	-	\$0.90
6 inches,	-	1.00
8 inches,	-	1.25
10 inches,	-	1.50
12 inches,	-	1.75
14 inches,	-	2.00
16 inches,	-	2.25
18 inches,	-	2.50
20 inches,	-	2.75
24 inches,	-	3.50

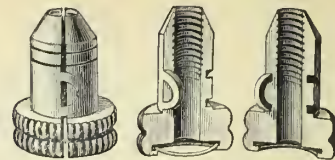


No. 38



No. 39

FAY'S PATENT SPRING DIVIDERS.

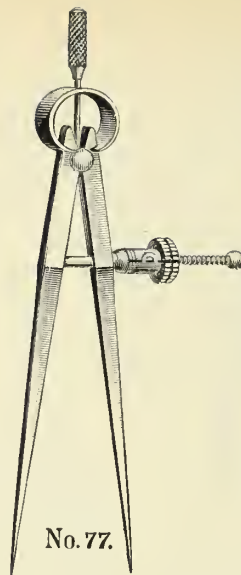


WITH SPRING NUT.

The Fay Calipers and Dividers, Nos. 74 to 77, all sizes, are sent with spring nut unless otherwise ordered.

2 1/2 inches, each, with spring nut,	\$1.15
3 inches, each, with spring nut,	1.15
4 inches, each, with spring nut,	1.40
5 inches, each, with spring nut,	1.40
6 inches, each, with spring nut,	1.75

2 1/2 inches, with solid nut,	-	\$1.00
3 inches, with solid nut,	-	1.00
4 inches, with solid nut,	-	1.25
5 inches, with solid nut,	-	1.25
6 inches, with solid nut,	-	1.50



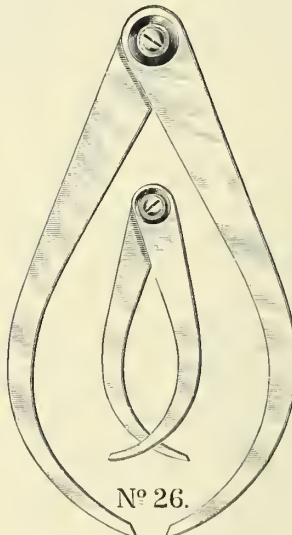
No. 77.

IMPROVED FIRM-JOINT CALIPERS.

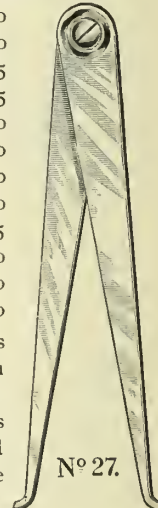
3 inches,	\$0.40
4 inches,	.50
5 inches,	.55
6 inches,	.65
8 inches,	.80
10 inches,	.90
12 inches,	1.00
14 inches,	1.50
16 inches,	1.75
18 inches,	2.10
20 inches,	2.50
24 inches,	3.00

The above sizes refer to the length of the Calipers.

Their capacity is about one-third greater than the size given.

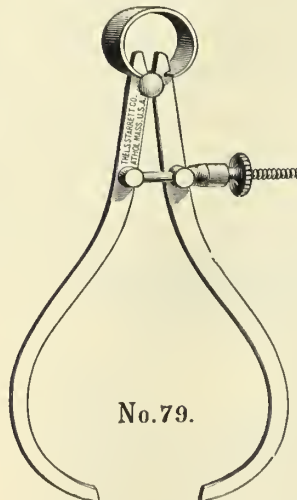


No. 26.

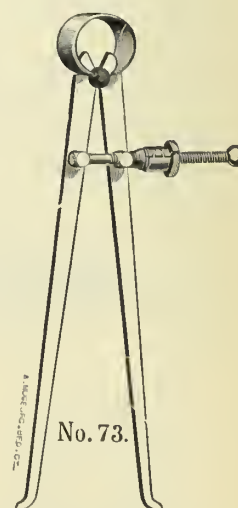


No. 27.

OUTSIDE AND INSIDE CALIPERS.



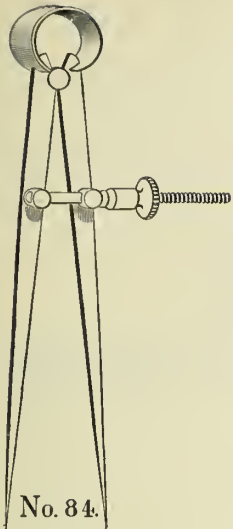
No. 79.



No. 73.

No. 79.—2 1/2 to 8 inches, with solid nut. 65c; 70c.; 75c.; 80c.; 85c.; \$1.00.
No. 73.—2 1/2 to 8 inches, with spring nut. 90c.; 95c.; \$1.00; \$1.05; \$1.10; \$1.25
Sent with solid nut unless otherwise ordered.

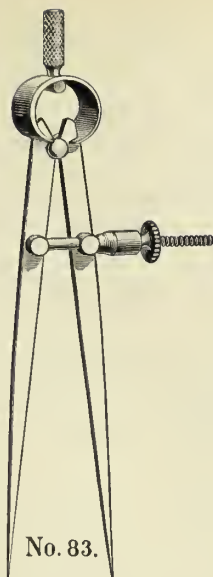
SPRING DIVIDERS.



No. 84.

No. 84.

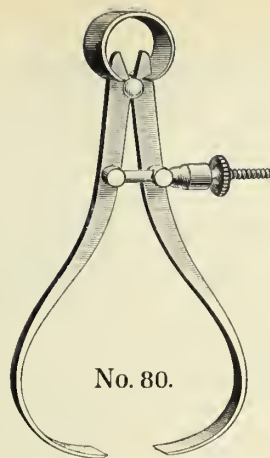
2½ inches, each,	\$0.65
3 inches, each,	.70
4 inches, each,	.75
5 inches, each,	.80
6 inches, each,	.85
8 inches, each,	1.10



No. 83.

No. 83.

With thumb screw attachment,	\$0.80
With thumb screw attachment,	.85
With thumb screw attachment,	.90
With thumb screw attachment,	.95
With thumb screw attachment,	1.00
With thumb screw attachment,	1.25



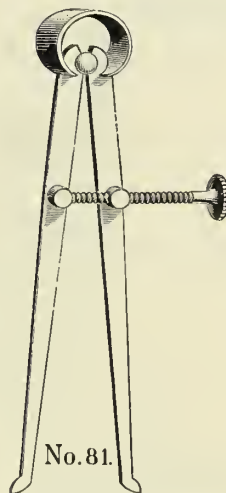
No. 80.

THREAD CALIPERS.

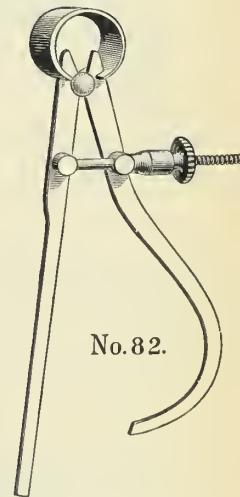
Price, 3 inches, with solid nut,	\$0.75
Price, 4 inches, with solid nut,	.90
Price, 5 inches, with solid nut,	1.00

With spring nut,	-	-	\$1.00
With spring nut,	-	-	1.15
With spring nut,	-	-	1.25

INSIDE AND KEYHOLE CALIPERS.

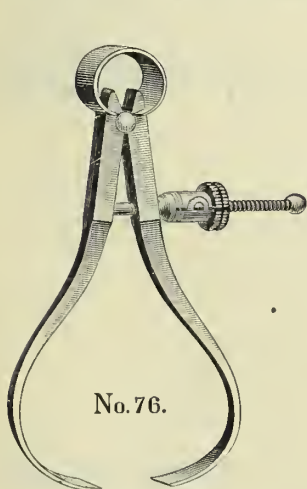


No. 81.

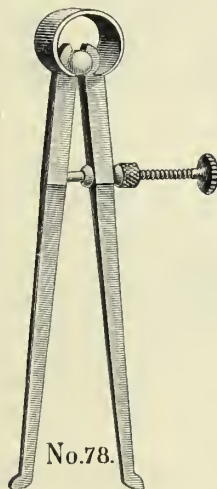


No. 82.

THREAD AND INSIDE CALIPERS.



No. 76.



No. 78.

THREAD, No. 76

	Solid Nut.	Spring Nut.
3 inches,	\$1.00	\$1.15
4 inches,	1.10	1.25
5 inches,	1.10	1.25

INSIDE, No. 78

	Solid Nut.
4 inches,	\$1.10
5 inches,	1.10

INSIDE CALIPERS.

Inside Calipers.—4 inches, with solid nut, each,	-	-	.75
Inside Calipers.—5 inches, with solid nut, each,	-	-	.80
Inside Calipers.—6 inches, with solid nut, each,	-	-	.85
Keyhole Calipers.—3 inches, with solid nut, each,	-	-	.70
Keyhole Calipers.—4 inches, with solid nut, each,	-	-	.75

KEYHOLE CALIPERS.

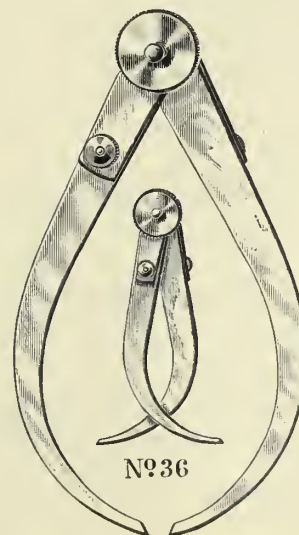
LOCK-JOINT TRANSFER CALIPERS.

NEW FIRM-JOINT HERMAPHRODITE CALIPERS.



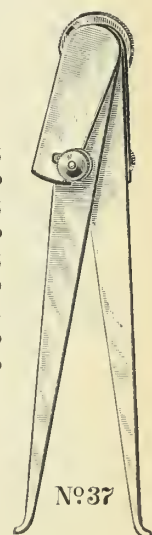
No. 41.

3 inches,	-	-	\$0.40	8 inches	-	-	\$0.80
4 inches,	-	-	.50	10 inches,	-	-	.90
5 inches,	-	-	.55	12 inches,	-	-	1.00
6 inches,	-	-	.65				



No. 36

4 inches,	\$1.25
6 inches,	1.50
8 inches,	1.75
10 inches,	2.00
12 inches,	2.25
14 inches,	2.50
16 inches,	2.75
18 inches,	3.00
20 inches,	3.50
24 inches,	4.25



No. 37

FIG. 957.



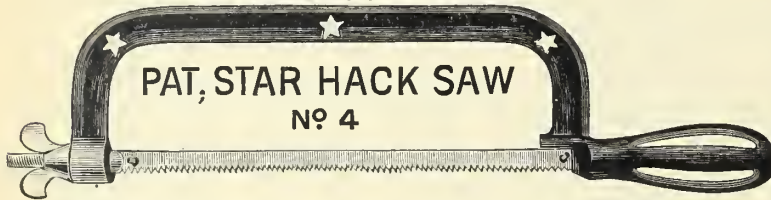
Length of blade,	-	-	6	7	8	9	10	11	12	Assorted, 6 to 9
Price per dozen,	-	-	\$0.55	.60	.65	.70	.85	.95	1.05	.65
Price per gross,	-	-	6.60	7.20	7.80	8.40	10.20	11.40	12.60	7.80

The blades in the above list are our standard goods with 14 teeth to the inch; also made in the 8, 9, 10, 11 and 12 inch blades, with 23 teeth to the inch, for cutting tubing, thin sheets of metal for brass work, the price of each kind being the same. Both kinds have a good set. In filling orders we shall always put in the coarse blades, unless the fine ones are particularly named.

No. 2, solid frame, to hold 8 inch blades only, and face them in four directions. Polished and nickel-plated. Cocobola handle.

Price, per dozen, - - - - - \$8.40

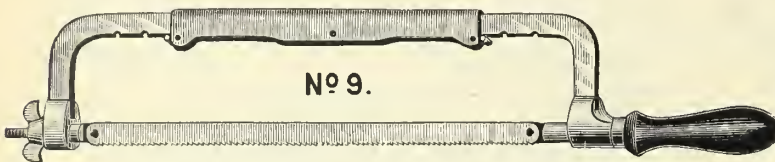
FIG. 959.



This is the stiffest frame made. It is highly polished, heavily nickel-plated, and will face the blades in four directions. The handle is ebonized. This No. 6 frame will hold all blades from 6 to 12 inches.

Price of No. 6 frame, per dozen, - - - - - \$12.00

FIG. 961.

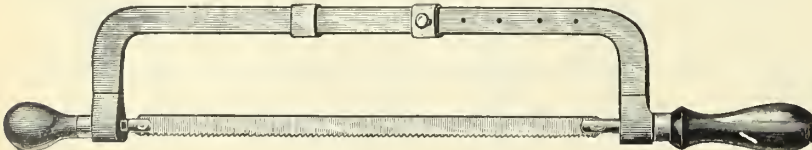


PATENT STAR HACK SAW.

We offer this as the best extensive frame in the market. It is light and quickly adjusted, having strength in the middle, where strength is needed. It is made of tempered steel, polished and nickel-plated. The handles are Cocobola wood, highly finished. It carries blades 6, 7, 8, 9, 10, 11 and 12 inches long.

Price, per dozen, - - - - - \$12.00

FIG. 963.



No. 11.

PATENT STAR HACK SAW.

A prominent feature of this frame is that the entire length of the blade can be used without liability of injuring the hand on back stroke. It takes blades from 6 to 9 inches, and faces them in four directions. Polished and nickel-plated, and with Cocobola handle.

Price, per dozen, - - - - - \$9.00

STAR HACK SAW BLADES.

WITH 14 OR 23 POINTS.

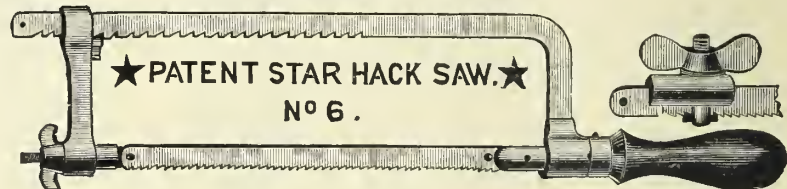
FIG. 958



This No. 4 is a patent cast iron frame, and so constructed as to face blades in four different directions. The pins which hold the blade are fast in the frame, and cannot drop out. It is a very stiff and desirable frame with Japan finish.

No. 4 A, for 8-inch blades, per dozen, - - - - - \$3.00
No. 4 B, for 9-inch blades, per dozen, - - - - - 3.00

FIG. 960.

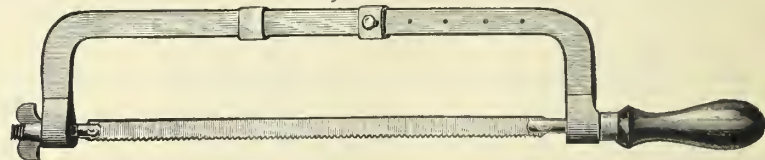


PATENT STAR HACK SAW.

This frame holds blades from 8 to 12 inches in length. It is an extension frame covered by a steel sheath, as seen in the cut. The sheath makes it very stiff, and at the same time very light. It is polished and nickel-plated. The blades may be faced in either direction.

Price, per dozen, - - - - - \$12.00

FIG 962.



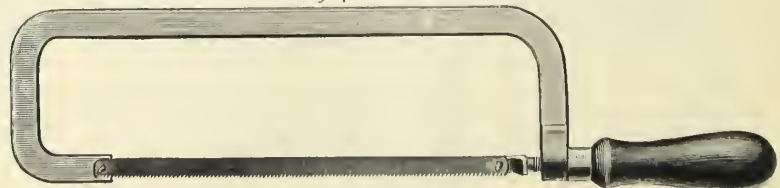
No. 10.

PATENT STAR HACK SAW.

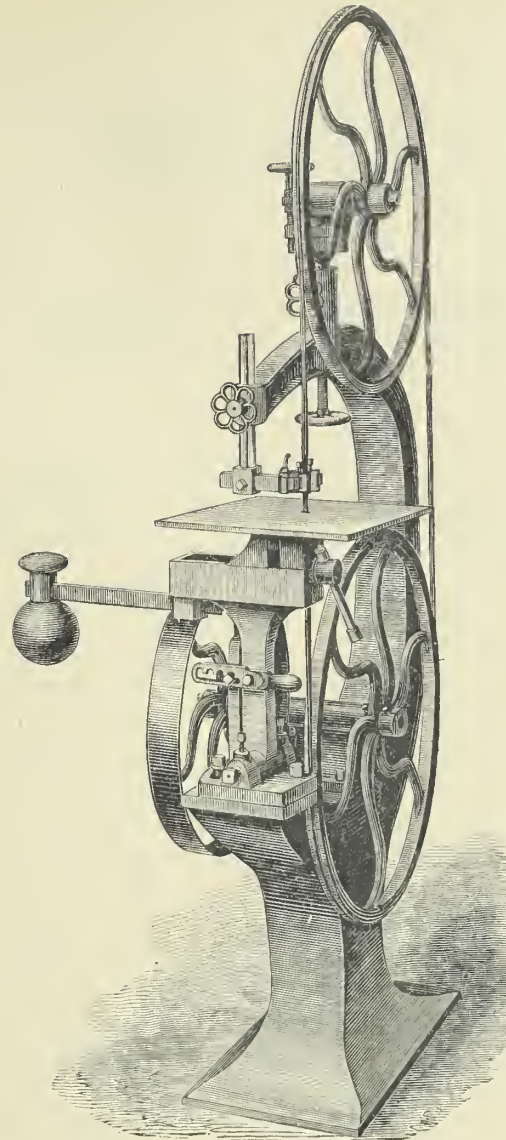
This frame has a ball handle at forward end which will recommend itself. In all other respects the frame is the same as No. 10.

Price, per dozen, - - - - - \$13.50

FIG. 964



No. 12



METAL BAND SAWS.

WITH SAW GUIDE, VISE AND TABLE, SHOWING VISE AND METHOD OF CUTTING RODS.

THESE machines are made with a vise for holding rods, bars or other stock that requires to be clamped. The vise is adjustable, so that by swinging the jaws slightly out of line, the rods to be cut will pass in front of the back run of the saw, and stock may be cut to any length that may be desired. It will hold steel $4\frac{1}{2}$ inches diameter.

The table is held in the jaws of the vise for use in cutting up sheet metals and for general band saw work.

By means of the saw guide the saw may be turned out of line with the face of the wheel, and at a right angle with the jaws of the vise when set for cutting up long stock. By an adjustment of the guide the saw may also be prevented from running and a square cut secured.

The "feed" is automatic and adjusts itself to the amount of metal being cut.

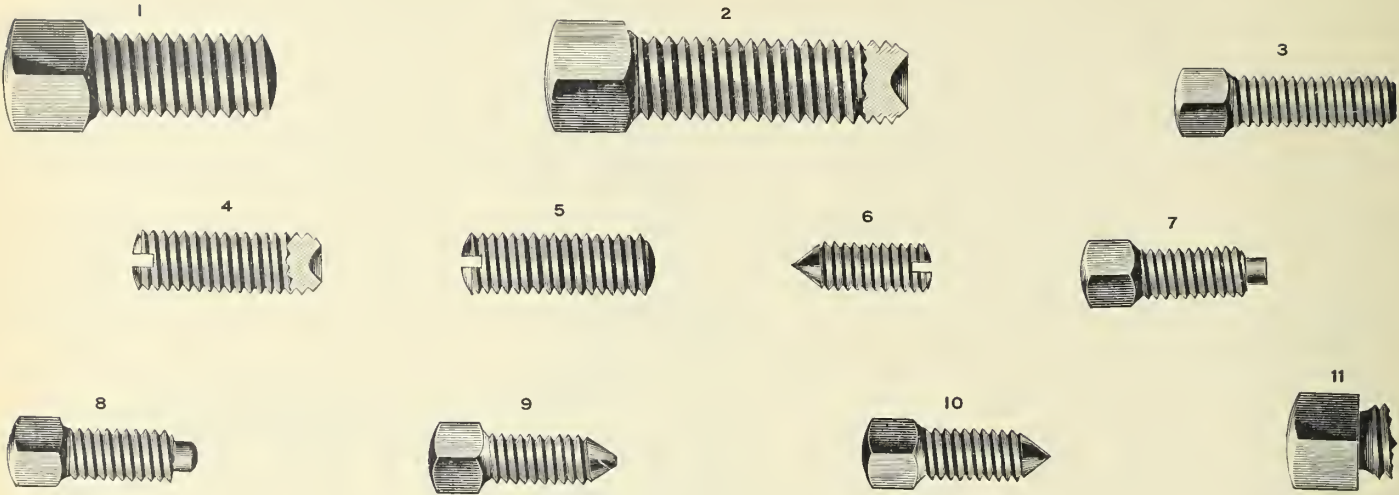
The saws are so tempered that the liability of breakage is reduced to a minimum, the cutting edge having the usual hack saw temper, while the back is drawn very much lower. We make three grades of saws, coarse, for large work; medium, for ordinary stock cutting; fine, for sheet metal or any stock less than $\frac{3}{16}$ inch thick.

For general use the saws should run about one hundred feet per minute or eighteen revolutions of the shaft. For the softer metals the speed may be considerably increased.

Having used one of these machines several months in our own work, we do not hesitate to guarantee that they will do more work than any others now on the market, and at less cost for saws and labor.

Complete, with saw, vise and table,	- - - - -	Each, \$75.00
Countershafts,	- - - - -	Each, 7.50
Extra saws,	- - - - -	Each, 1.35

STEEL AND CASE-HARDENED IRON SET SCREWS.



No. 1. Regular Round Point Set.

" 2. Cup Point, Set.

" 3. Flat Point, Set.

" 4. Cup Point, Headless.

" 5. Round Point, Headless.

" 6. Cone Point, Headless.

No. 7. Flat, Pivot Point.

" 8. Round, Pivot Point.

" 9. Hanger, Set Point.

" 10. Cone Point.

" 11. Necked Style.

In filling orders, style No. 1 is always forwarded, unless other kinds are specified.

Oval and Cup Point Set Screws are regular, all other kinds are special, and when ordered in lots of less than 500 of one diameter and length, will be charged at 10 per cent. less discount.

Set Screw prices shall apply to Headless Set Screws, threaded over all or nearly so; slotted, and burrs removed from head and slot.

Set Screws, with ground or polished heads, 10 per cent. less discount. Set Screws, with heads polished after hardening, 20 per cent. less discount.

No screw, which has a head more than 1-16 of an inch larger than the body, shall be classed as a set screw.

A rough screw, requiring over-size stock, shall take the same price as a soft set screw, with head of same size, limited by the article preceding.

STEEL SET SCREWS.

PRICE PER 100.

Diameter of Screw.	1-4	5-16	3-8	7-16	1-2	9-16	5-8	3-4	7-8	1	1 1-8	1 1-4
Length under head to extreme point.												
3-4	2 50	2 75	3 10	3 60	4 25	5 30	6 25	8 75				
1 1-4	2 65	2 90	3 30	3 90	4 50	5 30	6 25	8 75	14 10			
1 1-2	2 85	3 10	3 50	4 15	4 75	5 60	6 55	8 75	14 10	18 60		
1 3-4	3 05	3 30	3 70	4 40	5 00	5 90	6 90	9 35	14 10	18 60	24 40	
2	3 25	3 50	3 90	4 65	5 25	6 25	7 25	10 00	15 00	19 80	24 40	31 60
2 1-4	3 50	3 75	4 15	4 95	5 55	6 60	7 60	10 15	16 10	21 25	26 35	31 60
2 1-2	3 80	4 05	4 45	5 30	5 90	7 05	8 00	11 00	17 25	23 00	28 60	34 25
2 3-4	4 10	4 45	4 80	5 75	6 35	7 55	8 50	12 50	18 50	24 70	30 85	37 00
3	4 45	4 80	5 20	6 20	6 85	8 10	9 05	13 50	19 85	26 65	33 40	40 00
3 1-4	4 75	5 20	5 75	6 75	7 45	8 75	9 70	14 60	21 35	28 75	36 00	43 25
3 1-2		5 55	6 10	7 30	8 05	9 45	10 45	15 85	23 00	30 85	38 75	46 75
3 3-4			6 55	7 90	8 70	10 15	11 20	17 10	24 60	33 25	41 50	50 25
4				8 50	9 35	11 50	12 70	19 60	27 85	37 25	47 00	57 25
4 1-4					9 95	12 10	13 45	20 85	29 50	39 40	49 75	60 75
4 1-2						12 10	14 20	22 10	31 00	41 50	52 50	64 30
4 3-4							14 20	23 40	32 75	43 60	55 25	67 95
5									34 40	45 75	58 00	71 25
Threads to inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for each 1-4 inch	35	40	50	60	70	80	90	1 30	1 75	2 30	3 00	3 75

CASE HARDENED IRON SET SCREWS.

PRICE PER 100.

Diameter of Screw.	1-4	5-16	3-8	7-16	1-2	9-16	5-8	3-4	7-8	1	1 1-8	1 1-4
Threads to inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for each 1-4 inch.	25	30	35	45	50	55	60	1 00	1 30	1 70	2 20	2 80
Length under head to extreme point												
3-4	2 00	2 20	2 50	2 90	3 40	4 25	5 00					
1	2 15	2 35	2 65	3 10	3 60	4 25	5 00	7 00				
1 1-4	2 30	2 50	2 80	3 30	3 80	4 50	5 25	7 50	11 30			
1 1-2	2 45	2 65	2 95	3 50	4 00	4 75	5 50	8 00	12 00	15 90		
1 3-4	2 60	2 80	3 10	3 70	4 20	5 00	5 75	8 60	12 90	17 00	19 50	
2	2 80	3 00	3 30	3 95	4 45	5 30	6 05	9 30	13 50	18 40	22 90	27 40
2 1-4	3 05	3 25	3 55	4 25	4 75	5 65	6 40	10 00	14 80	19 80	24 70	29 60
2 1-2	3 30	3 55	3 85	4 60	5 10	6 05	6 80	10 80	15 90	21 40	26 70	32 00
2 3-4	3 55	3 85	4 20	5 00	5 60	6 55	7 30	11 70	17 10	23 00	28 80	34 60
3	3 80	4 15	4 55	5 45	6 05	7 00	7 75	12 70	18 40	24 70	31 00	37 40
3 1-4		4 45	5 25	6 25	6 85	7 85	8 60	13 70	19 70	26 40	33 20	40 20
3 1-2			5 25	6 35	6 95	8 00	8 75	14 70	21 00	28 10	35 40	43 00
3 3-4				6 80	7 95	9 20	10 00	15 15	22 30	29 80	37 60	45 80
4					8 75	10 15	11 35	16 70	24 00	32 50	41 40	51 40
4 1-4						11 35	12 85	18 30	26 30	35 80	45 80	56 80
4 1-2							13 50	20 40	29 40	39 40	50 40	62 40
4 3-4								22 50	32 50	43 50	55 50	68 50
5									27 50	39 50	52 50	66 50

For price of Steel Set Screws, add 50 per cent. to above list.

HEXAGON HEAD CAP SCREWS.

PRICE PER 100.

Diameter of Head.	7-16	1-2	9 16	5-8	3-4	13 16	7-8	1	1 1-8	1 1-4	1 3-8	1 1-2
Length of Head.	1-4	5-16	3-8	7-16	1-2	9 16	5-8	3-4	7-8	1	1 1-8	1 1-4
Diameter of Screw.	1-4	5-16	3-8	7-16	1-2	9 16	5-8	3-4	7-8	1	1 1-8	1 1-4
3/4	3 00	3 25	3 75	4 40	5 50	7 00						
1	3 25	3 50	4 00	4 70	5 70	7 00	9 50					
1 1/4	3 50	3 75	4 25	5 00	6 00	7 50	9 50	12 20				
1 1/2	3 75	4 00	4 50	5 30	6 30	8 00	10 00	12 20	16 00			
1 3/4	4 00	4 25	4 75	5 60	6 60	8 50	10 60	12 80	16 60	21 20		
2	4 25	4 60	5 05	5 95	7 00	9 10	11 20	13 40	17 20	22 30	29 00	37 50
2 1/4	4 55	5 00	5 40	6 35	7 50	9 70	11 90	14 10	17 90	23 60	30 50	39 30
2 1/2	4 85	5 40	5 80	6 80	8 00	10 40	12 70	14 90	18 80	25 10	32 30	41 40
2 3/4	5 15	5 80	6 30	7 30	8 60	11 20	13 60	15 90	20 00	26 90	34 40	44 00
3	5 45	6 20	6 80	7 90	9 30	12 10	14 70	17 00	21 80	29 00	37 00	47 50
3 1/4		6 60	7 30	8 50	10 10	13 10	16 00	18 60	23 80	31 40	40 00	51 50
3 1/2			7 80	9 10	10 90	14 10	17 30	20 25	25 80	33 80	43 00	55 50
3 3/4				9 70	11 70	15 10	18 60	21 80	27 80	36 20	46 00	59 50
4					12 50	16 10	19 90	23 40	29 80	38 60	49 00	63 50
4 1/4						17 10	21 20	25 00	31 80	41 00	52 00	67 50
4 1/2							22 50	26 60	33 80	43 40	55 00	71 50
4 3/4								28 20	35 80	45 80	58 00	75 50
5									37 80	48 20	61 00	79 50
Threads to Inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for each 1/4 inch	30	40	50	60	80	1 00	1 30	1 60	2 00	2 40	3 00	4 00

FIG. 966.

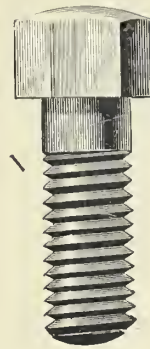
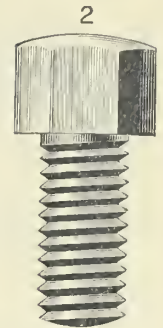


FIG. 967.



No. 1. REGULAR HEXAGON HEAD CAP SCREW.

On all screws of one inch and less in diameter, and less than four inches long, threads are cut $\frac{3}{4}$ of the length. Beyond four inches, threads are cut half of the length.

No. 2. TAP BOLT, THREADED TO THE HEAD.

Regular cap screws are soft and have ground heads. Black heads, 5 per cent. extra discount. Extra finished, 10 per cent. less discount. Case-hardened and extra finished heads, 15 per cent. less discount. Case-hardened, 5 per cent. less discount.

Cap screws with over-sized heads, take the list of regular cap screws with the same sized head.

Price of steel screws will be 50 per cent. above the price of iron.

SQUARE HEAD CAP SCREWS.

PRICE PER 100.

Diameter of Head.	3-8	7-16	1-2	9-16	5-8	11 16	3-4	7-8	1 1-8	1 1-4	1 3-8	1 1-2	1 5-8
Length of Head.	1-4	5-16	3-8	7-16	1-2	9 16	5-8	3-4	7-8	1	1 1-8	1 1-4	1 3-8
Diameter of Screw.	1-4	5-16	3-8	7-16	1-2	9 16	5-8	3-4	7-8	1	1 1-8	1 1-4	1 3-8
3/4	2 40	2 75	3 20	3 80	4 40	5 75							
1	2 60	2 95	3 40	4 00	4 70	5 75	7 70						
1 1/4	2 75	3 10	3 65	4 20	4 95	6 05	7 70	10 50					
1 1/2	2 90	3 30	3 85	4 45	5 25	6 35	8 25	10 50	14 00				
1 3/4	3 05	3 50	4 10	4 70	5 55	6 65	8 80	11 10	14 80	18 00			
2	3 25	3 70	4 35	4 95	5 90	7 05	9 40	11 80	15 70	19 00	22 50		
2 1/4	3 50	4 00	4 65	5 25	6 30	7 55	10 10	12 60	16 70	20 20	24 00	30 00	
2 1/2	3 75	4 35	5 00	5 60	6 75	8 15	10 90	13 50	17 80	21 50	25 80	32 00	39 00
2 3/4	4 00	4 70	5 45	6 00	7 25	8 85	11 80	14 60	19 10	23 10	27 90	34 20	41 50
3	4 25	5 05	5 90	6 55	7 80	9 65	12 80	15 90	20 60	25 00	30 50	37 00	45 00
3 1/4		5 40	6 35	7 10	8 45	10 55	14 00	17 40	22 40	27 30	33 50	40 50	49 00
3 1/2			6 80	7 80	9 10	11 45	15 20	18 90	24 20	29 60	36 50	44 00	53 00
3 3/4				8 20	9 75	12 35	16 40	20 40	26 00	31 90	39 50	47 50	57 00
4					10 40	13 25	17 60	21 90	27 80	34 20	42 50	51 00	61 00
4 1/4						14 15	18 80	23 40	29 60	36 50	45 50	54 50	65 00
4 1/2							20 00	24 90	31 40	38 80	48 50	58 00	69 00
4 3/4								26 40	33 20	41 10	51 50	61 50	73 00
5									35 00	43 40	54 50	65 00	77 00
Threads to Inch.	20	18	16	14	12	12	11	10	9	8	7	7	6
Add for each 1/4 inch	25	35	45	55	65	90	1 20	1 50	1 80	2 30	3 00	3 50	4 00

FIG. 968.

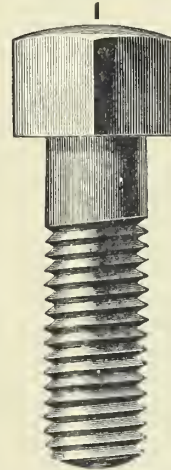
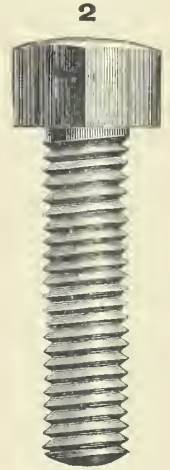


FIG. 969.



No. 1. REGULAR SQUARE HEAD CAP SCREW.

On all screws of one inch and less in diameter, and less than four inches long, threads are cut $\frac{3}{4}$ of the length. Beyond four inches, threads are cut $\frac{1}{2}$ of the length.

No. 2. TAP BOLT, THREADED TO THE HEAD.

Regular cap screws are soft and have ground heads. Black heads, 5 per cent. extra discount. Extra finished, 10 per cent. less discount. Case-hardened and extra finished heads, 15 per cent. less discount. Case-hardened, 5 per cent. less discount.

Cap screws with over-sized heads, take the list of regular cap screws with the same sized head.

Price of steel screws will be 50 per cent. above the price of iron.

FIG. 970.

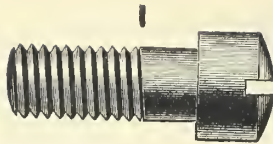
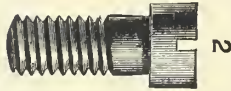


FIG. 971.



ROUND AND FILISTER HEAD CAP SCREWS.

No. 1. Filister Head Cap Screw.

No. 2. Round Head Cap Screw.

Threaded two-thirds of the length.

PRICE PER 100.												
Diameter, of Head. }	3-16	¼	⅜	7-16	9-16	⅝	¾	13-16	⅞	1	1½	1¾
Length of Head. }	⅝	3-16	¼	5-16	⅜	7-16	½	9-16	⅝	¾	⅞	1
Diameter of Screw. }	⅝	3-16	¼	5-16	⅜	7-16	½	9-16	⅝	¾	⅞	1
Length Under Head to Extreme Point.	¾	2 00	2 25	2 50	3 00	3 50	4 00	5 00	-	-	-	-
	1	2 25	2 50	2 75	3 25	3 75	4 25	5 30	6 60	9 00	-	-
	1¼	2 50	2 75	3 00	3 50	4 00	4 50	5 60	6 90	9 00	12 00	-
	1½	2 75	3 00	3 25	3 75	4 25	4 75	5 90	7 20	9 50	12 00	15 25
	1¾	3 00	3 25	3 50	4 00	4 50	5 00	6 20	7 50	10 00	12 50	15 25
	2	3 25	3 50	3 75	4 35	5 00	5 50	6 75	8 00	10 75	13 00	16 00
	2¼	3 50	3 75	4 00	4 75	5 50	6 00	7 25	8 50	11 50	13 75	16 75
	2½	3 75	4 00	4 25	5 15	6 00	6 50	7 75	9 00	12 00	14 50	17 50
	2¾	-	4 25	4 50	5 55	6 50	7 00	8 25	9 50	12 75	15 25	18 30
	3	-	-	4 75	6 35	7 50	8 00	9 25	10 50	14 25	16 75	20 00
	3¼	-	-	-	-	8 00	8 50	9 75	11 00	15 00	17 50	21 00
	3½	-	-	-	-	-	9 00	10 25	11 50	15 75	18 25	22 00
	3¾	-	-	-	-	-	-	10 75	12 50	17 25	19 75	24 00
	4	-	-	-	-	-	-	-	12 50	18 00	21 25	26 00
	4¼	-	-	-	-	-	-	-	-	-	-	27 00
	4½	-	-	-	-	-	-	-	-	-	-	27 00
	4¾	-	-	-	-	-	-	-	-	-	-	27 00
	5	-	-	-	-	-	-	-	-	-	-	27 00
Threads to Inch. }	40	24	20	18	16	14	12	12	11	10	9	8
Add for Each ¼ Inch. }	25	25	25	40	50	50	50	50	75	75	1 00	1 25

FLAT HEAD CAP SCREWS.

MILLED FROM SOLID BAR.

PRICE PER 100.

Diameter of Head. }	¼	⅜	15-32	⅝	¾	13-16	⅞	1	1½	1¾
Diameter of Screw. }	¼	3-16	¼	5-16	⅜	7-16	½	9-16	⅝	¾
Length Over All.	¾	2 25	2 50	3 10	4 00	5 00	-	-	-	-
	1	2 50	2 75	3 35	4 25	5 30	6 60	-	-	-
	1¼	2 75	3 00	3 60	4 50	5 60	6 90	9 00	-	-
	1½	3 00	3 25	3 85	4 75	5 90	7 20	9 50	12 00	-
	1¾	3 25	3 50	4 10	5 00	6 20	7 50	10 00	12 50	14 50
	2	-	3 75	4 35	5 50	6 75	8 00	10 75	13 00	15 25
	2¼	-	-	4 75	6 00	7 25	8 50	11 50	13 75	16 00
	2½	-	-	-	6 50	7 75	9 00	12 00	14 50	16 75
	2¾	-	-	-	7 00	8 25	9 50	12 75	15 25	17 50
	3	-	-	-	-	8 75	10 00	13 50	16 00	18 30
Threads to Inch. }	40	24	20	18	16	14	12	12	11	10
Add for Each ¼ Inch. }	25	25	40	50	50	50	50	75	1 00	1 25

BUTTON HEAD CAP SCREWS.

MILLED FROM SOLID BAR.

PRICE PER 100.

Diameter of Head. }	*7-32 Full	5-16	7-16	9-16	⅝	¾	13-16	15-16	1	1 ¼
Diameter of Body. }	⅝	3-16	¼	5-16	⅜	7-16	½	9-16	⅝	¾
Length Under Head to Extreme Point.	¾	2 25	2 50	3 00	3 50	4 00	5 00	-	-	-
	1	2 50	2 75	3 25	3 75	4 25	5 30	6 60	9 00	-
	1¼	2 75	3 00	3 50	4 00	4 50	5 60	6 90	9 00	-
	1½	3 00	3 25	3 75	4 25	4 75	5 90	7 20	9 50	12 00
	1¾	3 25	3 50	4 00	4 50	5 00	6 20	7 50	10 00	12 50
	2	-	3 75	4 35	5 00	5 50	6 75	8 00	10 75	13 00
	2¼	-	-	4 75	5 50	6 00	7 25	8 50	11 50	13 75
	2½	-	-	-	6 00	6 50	7 75	9 00	12 00	14 50
	2¾	-	-	-	-	7 00	8 25	9 50	12 75	15 25
	3	-	-	-	-	-	8 75	10 00	13 50	16 00
Threads to Inch. }	40	24	20	18	16	14	12	12	11	10
Add for Each ¼ Inch. }	25	20	40	50	50	50	50	75	75	1 15

*No. 4 Wire.

FIG. 975.

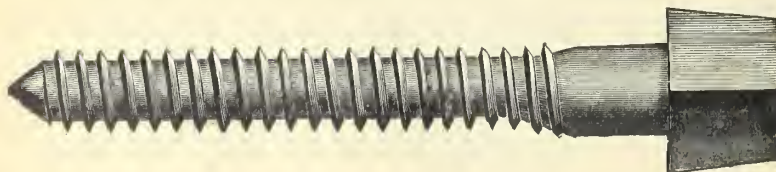


FIG. 972.

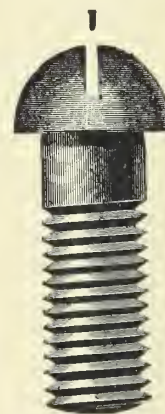


FIG. 973.



FIG. 974.



No. 1. Button Head Cap Screws.

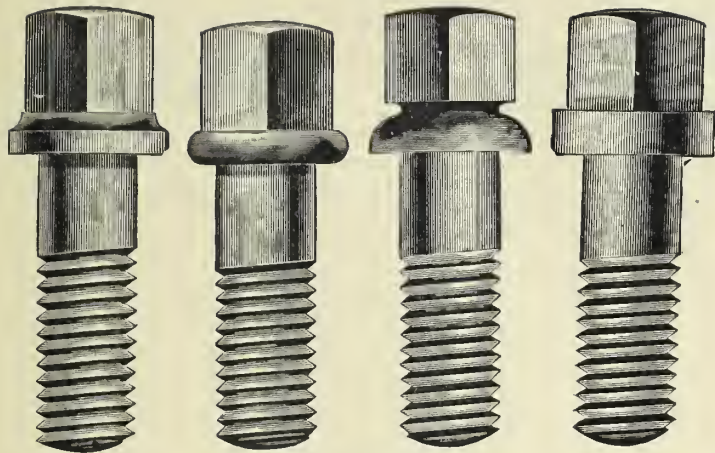
No. 2. Flat Head Cap Screws.

No. 3. French Head Cap Screws.

ORE WASHER SCREWS.

Prices quoted on application.

FIG. 976.

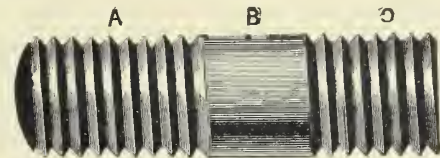
**COLLAR SCREWS.**

No. 1. Regular Collar Screw.
Nos. 2, 3 and 4. Special Collar Screw.
Threaded three-fourths of length of body.

PRICE PER 100.

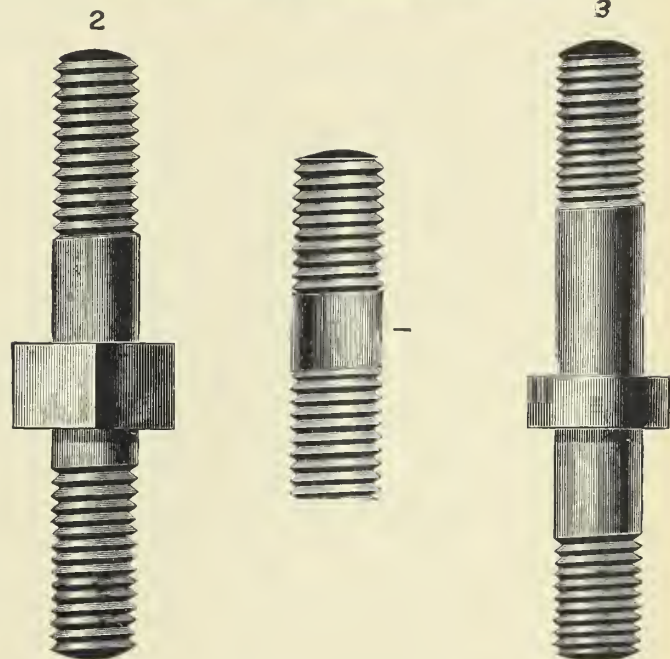
Diameter of Collar.	1/4	11/32	7/16	1/2	5/8	11/16	13/16	15/16	1	1 1/4
Diameter of Screw.	1/8	9/16	1/4	5/16	3/8	7/8	1/2	9/16	5/8	3/4
Length under head to extreme point.	3/4	2 50	2 80	3 10	3 75	4 40	5 00	6 25		
1	2 80	3 10	3 40	4 05	4 70	5 30	6 60	8 25		
1 1/4	3 10	3 40	3 70	4 35	5 00	5 60	7 00	8 60	11 25	
1 1/2	3 40	3 70	4 00	4 70	5 30	5 95	7 40	9 00	11 90	15 00
1 3/4	3 70	4 05	4 35	5 05	5 65	6 35	7 80	9 45	12 60	15 60
2	4 40	4 70	5 45	6 25	6 85	7 40	9 00	10 60	14 15	17 10
2 1/4			5 05	5 95	6 85	7 40	9 00	10 60	14 15	17 10
2 1/2			5 45	6 45	7 55	8 05	9 60	11 25	15 00	18 00
2 3/4				6 95	8 20	8 75	10 30	11 90	15 90	19 00
3				7 50	8 85	9 50	11 00	12 60	16 85	20 00
3 1/4					9 50	10 30	11 80	13 40	17 95	21 20
3 1/2					10 20	11 10	12 60	14 30	19 10	22 60
3 3/4						11 95	13 50	15 30	20 40	24 20
4						12 80	14 40	16 30	21 70	25 80
4 1/4							15 40	17 30	23 20	27 70
4 1/2							16 40	18 70	24 70	29 60
4 3/4								20 10	26 50	31 80
5								21 50	28 30	34 00
Threads to inch.	40	24	20	18	16	14	12	12	11	10
Add for each 1/4 inch.	30	40	50	60	80	1 00	1 30	1 60	2 00	2 40

FIG. 977.



PRICE PER 100.

Diameter.	3/8	7-16	1/2	9-16	5/8	3/4	7/8	1	1 1/8	1 1/4
Length of Studs.										
1 1/4	3 35	4 05	4 40	5 10						
1 1/2	3 50	4 20	4 60	5 30	6 10					
1 3/4	3 65	4 35	4 80	5 50	6 30					
2	3 80	4 50	5 00	5 70	6 50	8 80				
2 1/4	3 95	4 65	5 20	5 90	6 70	9 10				
2 1/2	4 10	4 80	5 40	6 10	6 90	9 40	12 00			
2 3/4	4 25	4 95	5 60	6 30	7 10	9 70	12 50			
3	4 40	5 10	5 80	6 50	7 30	10 00	13 00	17 00	21 00	
3 1/4		5 25	6 00	6 70	7 50	10 30	13 50	17 75	22 00	
3 1/2		5 40	6 20	6 90	7 70	10 60	14 00	18 50	23 00	27 00
3 3/4		5 55	6 40	7 10	7 90	10 90	14 50	19 25	24 00	28 00
4			6 60	7 30	8 10	11 20	15 00	20 00	25 00	29 00
4 1/4			6 70	7 40	8 25	11 45	15 40	20 50	25 75	29 75
4 1/2			6 80	7 50	8 40	11 65	15 75	21 00	26 50	30 50
4 3/4				7 60	8 55	11 90	16 15	21 50	27 25	31 25
5				7 70	8 70	12 10	16 50	22 00	28 00	32 00
5 1/4				7 80	8 85	12 35	16 90	22 50	28 75	32 75
5 1/2					9 00	12 55	17 25	23 00	29 50	33 50
5 3/4					9 15	12 80	17 65	23 50	30 25	34 25
6					9 30	13 00	18 00	24 00	31 00	35 00
Threads to inch.	16	14	12	12	11	10	9	8	7	7
Add for each 1/4 inch.	15	20	20	20	25	30	40	60	75	1 00

**MILLED IRON STUDS.**

In ordering bolts, give total length, and length of A and C, as lettered above, and unless otherwise instructed A end will be tight fit, C end regular. State what finish required at B.

No. 1. Standard Stud Bolt.
Nos. 2 and 3. Special Stud Bolt.

MACHINE SCREWS, WITH PRESSED HEADS.

FIG. 978.



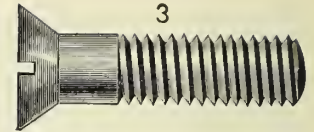
No. 1, Filister Head.

FIG. 979.



No. 2, Round Head.

FIG. 980.



No. 3, Flat Head.

IRON MACHINE SCREWS.

PER GROSS.

Threads per Inch.	56		48		32, 36, 40				30, 32			24, 30, 32		20, 24		16, 18, 20		16, 18			14, 16			
	No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.	
Inch.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
$\frac{3}{16}$	55	55	55	55	55																			
$\frac{1}{4}$	55	55	55	55	55	65	65	75	75															
$\frac{5}{16}$	55	55	55	55	55	65	65	75	75															
$\frac{3}{8}$	55	55	55	55	55	65	65	75	75	85	95	105												
$\frac{7}{16}$	55	55	55	55	55	65	65	75	75	85	95	105												
$\frac{1}{2}$	55	55	55	55	55	65	65	75	75	85	95	105	115	120	135	150								
$\frac{5}{8}$		60	60	60	60	65	65	75	75	85	95	105	115	120	135	150								
$\frac{3}{4}$			65	65	65	65	65	75	75	85	95	105	110	125	140	150	160							
$\frac{7}{8}$				75	75	75	75	85	85	95	95	105	110	115	130	135	160	170	190					
1					85	85	85	95	95	95	95	100	110	120	130	140	170	190	210	235				
$1\frac{1}{8}$						95	95	95	95	100	100	100	115	120	130	140	170	180	200	220	250			
$1\frac{1}{4}$							100	100	100	100	100	100	120	125	135	145	180	190	200	230	260			
$1\frac{3}{8}$								110	110	120	125	130	140	150	160	190	200	210	240	270				
$1\frac{1}{2}$									110	120	130	135	145	160	190	200	215	245	275					
$1\frac{3}{4}$										130	140	150	160	170	200	215	230	260	290					
2											150	160	170	190	215	230	245	275	310					
$2\frac{1}{4}$												175	190	200	220	245	260	290	340					
$2\frac{1}{2}$													200	215	240	260	275	310	380					
$2\frac{3}{4}$														230	250	275	290	340	420					
3															275	290	310	380	460					

BRASS MACHINE SCREWS.

PER GROSS.

Threads per Inch.	56		48		32, 36, 40				30, 32			24, 30, 32		20, 24		16, 18, 20		16, 18			14, 16			
	No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.	
Inch.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
$\frac{3}{16}$	70	70	70	80	80																			
$\frac{1}{4}$	70	70	70	80	80	100	110	125	145															
$\frac{5}{16}$	70	70	70	80	80	100	110	125	145															
$\frac{3}{8}$	70	70	70	80	80	100	110	125	145	170	200	230												
$\frac{7}{16}$	70	70	70	80	80	105	115	125	145	170	200	230												
$\frac{1}{2}$	70	70	70	80	80	105	115	125	145	170	200	230	330	370	420	470								
$\frac{5}{8}$		90	90	90	90	110	120	140	155	180	220	250	330	370	450	550								
$\frac{3}{4}$			110	110	110	120	125	160	165	195	240	270	360	400	550	630	660							
$\frac{7}{8}$				130	130	140	150	160	175	210	255	295	390	440	600	630	700	780						
1					150	150	170	180	190	230	275	320	415	470	650	680	780	805	940					
$1\frac{1}{8}$						180	180	200	220	250	300	350	450	510	675	730	790	870	1010					
$1\frac{1}{4}$							200	225	250	270	325	375	480	550	700	780	805	940	1080					
$1\frac{3}{8}$								250	270	325	350	410	520	590	725	790	870	1010	1150					
$1\frac{1}{2}$									325	350	370	430	545	630	750	805	940	1080	1220					
$1\frac{3}{4}$										375	425	500	625	780	870	1010	1150	1300	1400					
2											500	575	675	780	860	940	1080	1220	1400					
$2\frac{1}{4}$												650	775	805	910	1010	1150	1300	1520					
$2\frac{1}{2}$													800	870	980	1080	1220	1400	1650					
$2\frac{3}{4}$														940	1050	1150	1300	1520	1800					
3															1100	1220	1400	1650	2000					

On machine screws made to order, differing in length, size, thread, or head, from our regular standard flat and round head machine screws, special prices will be given on application, and also on filister head machine screws when ordered in less quantity than ten gross of a kind.

DROP FORGED STEEL THUMB SCREWS.

BLACK HEADS.

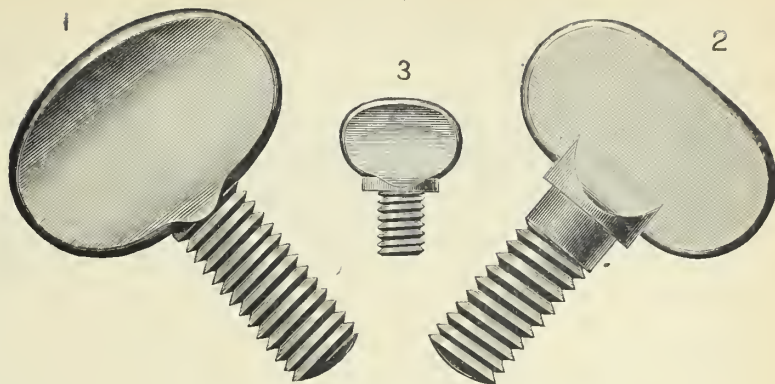
Inches under Head.	SHOULDER.		HUNDRED.			SET.	
	No. 1.	No. 2	No. 3	No. 4.	No. 5.	No. 10.	No. 11.
	3-16	¼	5-16	¼	⅜	7-16	½
¼	4.00	5.00	5.20	5.00	6.50		
½	4.20	5.20	5.50	5.20	7.00		
¾	4.40	5.40	6.00	5.50	7.50		
1	4.60	5.60	6.50	5.80	8.00	10.00	12.00
1 ¼	4.80	5.80	7.00	6.10	8.50	10.50	12.50
1 ½	5.00	6.00	7.50	6.50	9.00	11.00	13.00
1 ¾		6.20	8.00	7.00	9.50	11.50	13.50
2			8.50	7.50	10.00	12.00	14.00
2 ¼			9.00	8.00	10.50	12.50	14.50
2 ½			9.50	8.50	11.00	13.00	15.00
2 ¾			10.00	9.00	11.50	13.50	15.50
3			10.50	9.50	12.00	14.00	16.00
3 ¼			11.00	10.00	12.50	14.50	16.50
3 ½			11.50	10.50	13.00	15.00	17.00
3 ¾			12.00	11.00	13.50	15.50	17.50
4			12.50	11.50	14.00	16.00	18.00
4 ¼			13.00	12.00	14.50	16.50	18.50
4 ½			13.50	12.50	15.00	17.00	19.00
4 ¾			14.00	13.00	15.50	17.50	19.50
5			14.50	13.50	16.00	18.00	20.00

High finish 25 per cent. discount on above list.
Price of wing nuts given on application.

WINGED THUMB NUTS.

In ordering, state whether malleable, drop forged, or brass.
Also style of finish required.

FIG. 981.



DROP FORGED THUMB SCREWS.

No. 1. Regular set.

No. 2. Regular shoulder.

No. 3. Fancy milled.

FIG. 982.

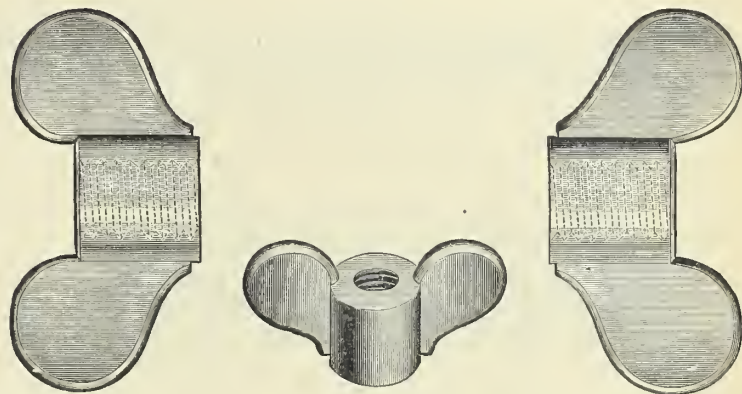
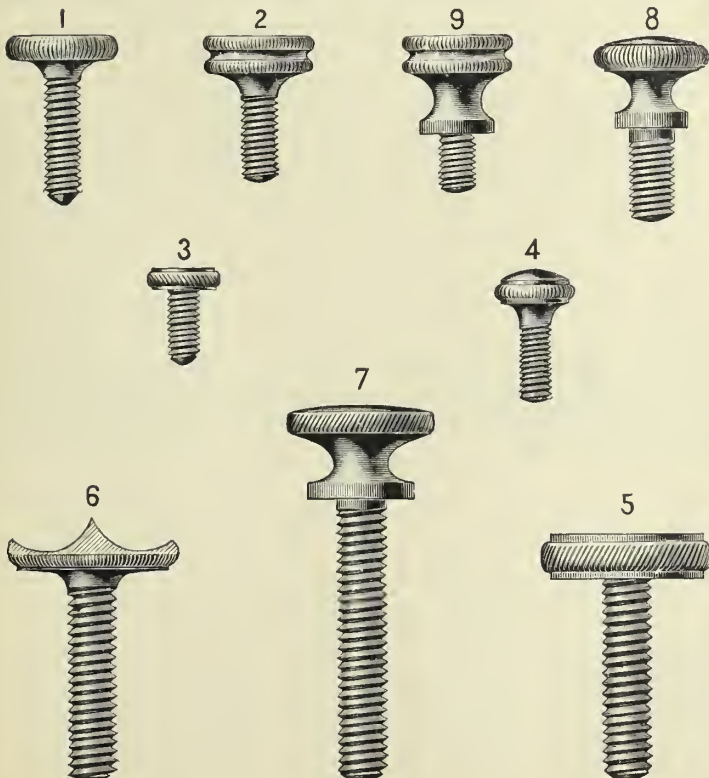


FIG. 983.



THUMB SCREWS.

No. 1. Regular knurled set.

No. 2. Regular double knurled set.

No. 3. Thin head plain set.

No. 4. Fancy head set.

No. 5. Fancy head set.

No. 6. Fancy head set.

No. 7. Regular shoulder single knurl.

No. 8. Regular shoulder single knurl.

No. 9. Regular shoulder double knurl.

In ordering, state whether brass or iron, whether bright or blued.

COACH AND LAG SCREWS.

With Square Heads. Price per 100.

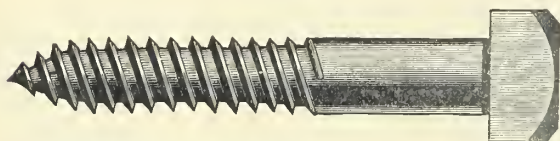
Diameter.	5-16	3/8	7-16	1/2	9-16 & 5/8	3/4	7/8	1
1 1/2	\$2.25	\$2.70	\$3.15	\$3.75	\$4.95			
2	2.40	2.88	3.39	4.05	5.40	\$7.92		
2 1/2	2.55	3.06	3.63	4.35	5.85	8.58		
3	2.70	3.24	3.87	4.65	6.30	9.24	\$12.30	
3 1/2	2.85	3.42	4.11	4.95	6.75	9.90	13.20	\$18.60
4	3.00	3.60	4.35	5.25	7.20	10.56	14.10	19.80
4 1/2	3.15	3.78	4.59	5.55	7.56	11.22	15.00	21.00
5	3.30	3.96	4.83	5.85	7.80	12.24	16.80	22.20
5 1/2	3.45	4.14	5.07	6.15	8.10	12.88	17.70	23.40
6	3.60	4.32	5.31	6.45	8.55	13.24	18.60	24.60
6 1/2			5.55	6.75	9.00	13.86	19.50	25.80
7			5.79	7.05	9.45	14.52	20.40	27.00
7 1/2			6.03	7.35	9.90	15.18	21.30	28.20
8			6.27	7.65	10.35	15.84	22.20	29.40
9			6.75	8.25	11.25	17.82	24.90	31.80
10				8.15	12.15	18.82	26.70	34.20
11				9.45	13.05	19.14	28.50	36.60
12				10.05	13.95	20.46	30.90	39.00

The following extras are to be understood as a part of this list :

Hexagon and Tee Heads 10 per cent. extra.

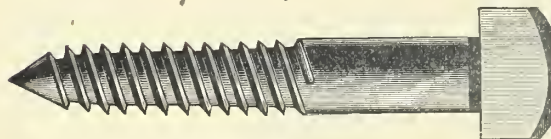
Skein Screws sold at the same price as Lag Screws.

FIG. 984.



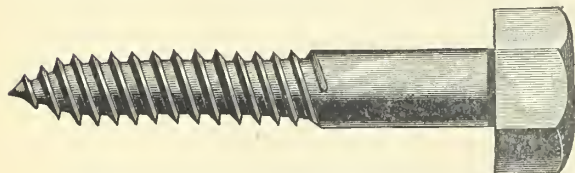
Square Head, Gimlet Pointed Coach Screw.

FIG. 985.



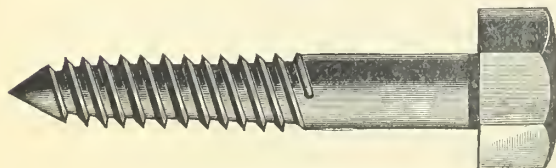
Square Head, Lag Screw.

FIG. 986.



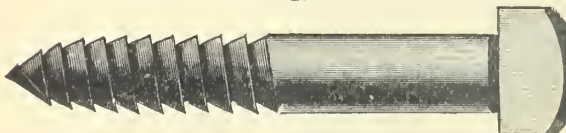
Hexagon Head, Gimlet Pointed Coach Screw.

FIG. 987.



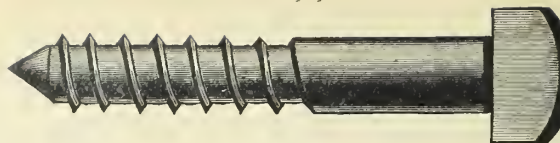
Hexagon Head, Lag Screw.

FIG. 988.



Fetter Drive Screw.

FIG. 989.



Skein Screw.

FIG. 990.



Gimlet Point, with Pipe Thread.

FIG. 991.



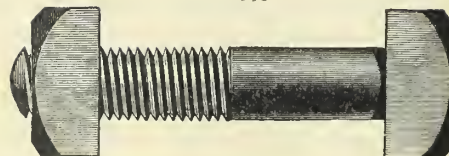
Double End, Gimlet Point.

FIG. 992.



Double End, Lag Screw.

FIG. 993.



MACHINE BOLTS.

Finished points, with Square Heads and Square Nuts.

Price per 100.

Diameter.	1/4	5-16	3/8	7-16	1/2	9-16 & 5/8	3/4	7/8	1
1 1/2	\$1.70	\$2.00	\$2.40	\$2.80	\$3.60	\$5.20	\$7.20	\$10.00	\$14.40
2	1.78	2.10	2.52	2.96	3.80	5.50	7.64	10.60	15.20
2 1/2	1.86	2.20	2.64	3.12	4.00	5.80	8.08	11.20	16.00
3	1.94	2.30	2.76	3.28	4.20	6.10	8.52	11.80	16.80
3 1/2	2.02	2.40	2.88	3.44	4.40	6.40	8.96	12.40	17.60
4	2.10	2.50	3.00	3.60	4.60	6.70	9.40	13.00	18.40
4 1/2	2.18	2.60	3.12	3.76	4.80	7.00	9.84	13.60	19.20
5	2.26	2.70	3.24	3.92	5.00	7.30	10.28	14.20	20.00
5 1/2	2.34	2.80	3.36	4.08	5.20	7.60	10.72	14.80	20.80
6	2.42	2.90	3.48	4.24	5.40	7.90	11.16	15.40	21.60
6 1/2	2.50	3.00	3.60	4.40	5.60	8.20	11.60	16.00	22.40
7	2.58	3.10	3.72	4.56	5.80	8.50	12.04	16.60	23.20
7 1/2	2.66	3.20	3.84	4.72	6.00	8.80	12.48	17.20	24.00
8	2.74	3.30	3.96	4.88	6.20	9.10	12.92	17.80	24.80
9	2.90	3.50	4.20	5.20	6.60	9.70	13.80	20.00	26.40
10	3.06	3.70	4.44	5.52	7.00	10.30	14.68	22.00	28.00
11	3.22	3.90	4.68	5.84	7.40	10.90	15.56	24.00	29.60
12	3.38	4.10	4.92	6.16	7.80	11.50	16.44	26.00	31.20
13			5.16	6.48	8.20	12.10	17.32	28.00	32.80
14			5.40	6.80	8.60	12.70	18.20	30.00	34.40
15			5.64	7.12	9.00	13.30	19.08	32.00	36.00
16			5.88	7.44	9.40	13.90	19.96	34.00	37.60
17					9.80	14.50	20.84	36.00	39.20
18					10.20	15.10	21.72	38.00	40.80
19					10.60	15.70	22.60	40.00	42.40
20					11.00	16.30	23.48	42.00	44.00

The following extras are to be understood as a part of this list.

Bolts with hexagon heads or hexagon nuts, 10 per cent. extra.

If both hexagon heads or hexagon nuts, 20 per cent. extra.

Joint bolts with oblong nuts, bolts with tee heads, askew heads and eccentric heads, 10 per cent. extra.

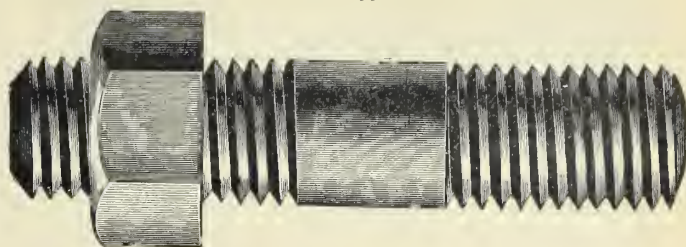
For prices of extra nuts and extra lengths of thread, see Standard List.

Special bolts with irregular threads and unusual dimensions of heads or nuts will be charged extra at the discretion of the manufacturer.

PRICE PER 100.

Diameter.	3-8	7-16	1/2	9-16	5 8	3 4	7 8	1
No. Threads to Inch.	16	14	13	12	11	10	9	8
1 1/2	4 00	5 10	5 50					
1 3/4	4 10	5 25	5 65					
2	4 20	5 40	5 80	8 50	8 50	12 40		
2 1/4	4 30	5 55	5 95	8 75	8 75	12 70		
2 1/2	4 40	5 70	6 10	9 00	9 00	13 00	18 00	
2 3/4	4 50	5 85	6 25	9 25	9 25	13 30	18 50	
3	4 60	6 00	6 40	9 50	9 50	13 60	19 00	27 80
3 1/4	4 70	6 15	6 55	9 75	9 75	13 90	19 50	28 40
3 1/2	4 80	6 30	6 70	10 00	10 00	14 20	20 00	29 00
3 3/4	4 90	6 45	6 85	10 25	10 25	14 50	20 50	29 60
4	5 00	6 60	7 00	10 50	10 50	14 80	21 00	30 20
4 1/2	5 25	6 90	7 30	11 00	11 00	15 40	22 00	31 40
5			7 60	11 50	11 50	16 00	23 00	32 60
5 1/2			8 00	12 00	12 00	16 60	24 00	33 80
6			8 45	12 50	12 50	17 20	25 00	35 00
7				13 60	13 60	18 60	27 00	37 50
8				14 80	14 80	20 10	29 10	40 10

FIG. 994.



STUD BOLTS.

ROUGH IRON, WITH CHAMFERED AND TRIMMED

HEXAGON NUTS.

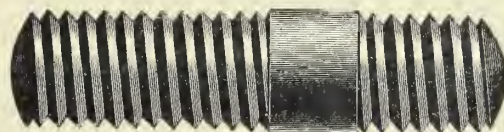
Milled studs, 15 per cent. extra.

In ordering give length of thread wanted on each end and length of body.

PRICE PER 100.

Diameter.	3-8	7-16	1/2	9-16	5-8	3-4	7-8	1	1 1-8	1 1-4	1 3-8
No. Threads to Inch.	16	14	13	12	11	10	9	8	7	7	6
1 1/4	3 35	4 05	4 40	5 10							
1 1/2	3 50	4 20	4 60	5 30	6 10						
1 3/4	3 65	4 35	4 80	5 50	6 30						
2	3 80	4 50	5 00	5 70	6 50	8 80					
2 1/4	3 95	4 65	5 20	5 90	6 70	9 10					
2 1/2	4 10	4 80	5 40	6 10	6 90	9 40	12 00				
2 3/4	4 25	4 95	5 60	6 30	7 10	9 70	12 50				
3	4 40	5 10	5 80	6 50	7 30	10 00	13 00	17 00	21 00		
3 1/4		5 25	6 00	6 70	7 50	10 30	13 50	17 75	22 00		
3 1/2			6 20	6 90	7 70	10 60	14 00	18 50	23 00	27 00	
3 3/4			6 40	7 10	7 90	10 90	14 50	19 25	24 00	28 00	
4			6 60	7 30	8 10	11 20	15 00	20 00	25 00	29 00	33 00
4 1/2				7 50	8 40	11 65	15 75	21 00	26 50	30 50	34 50
5				7 70	8 70	12 10	16 50	22 00	28 00	32 00	36 00
5 1/2					9 00	12 55	17 25	23 00	29 50	33 50	37 50
6						9 30	13 00	18 00	24 00	31 00	39 00

FIG. 995.



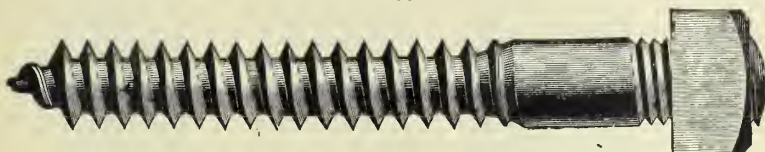
STUD BOLTS.

ROUGH IRON, WITHOUT NUTS.

Milled studs, 15 per cent. extra.

In ordering, give length of thread wanted on each end, and length of body.

FIG. 996.



STAY BOLTS.

Diameter,	3-4	13-16	7-8	15-16	1
Per foot,	16	17	18	19	21

A fit guaranteed if order is accompanied by a size plate.

Lengths shorter than 3 feet, special price.

HANGER BOLTS.

Diameter.	Length.	Price.
1/2 inch	4 to 6 inches	\$0.20
5/8 inch	5 to 7 inches	.16
3/4 inch	6 to 8 inches	.15
7/8 inch	7 to 9 inches	.14
1 inch	8 to 12 inches	.14

Any size made to order.

Hexagon nuts, 10 per cent. extra.

[FIG. 997.

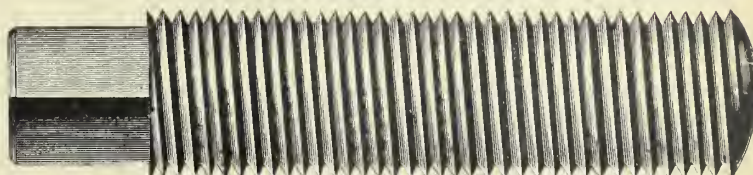
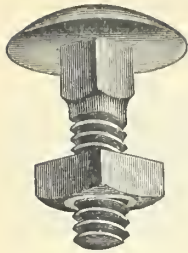


FIG. 998.



BUTTON HEAD.

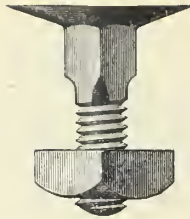
Diameter.

1-4
1-4
1-4
5-16
5-16
5-16
3-8
3-8
3-8
3-8

Length.

3-4
1
1 1/4 or 1 1/2
1
1 1/4 or 1 1/2
1 3/4 or 2
1 1/4
1 1/2
1 3/4
2

FIG. 999.

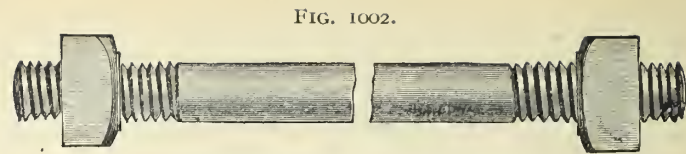


COUNTERSUNK HEAD.

Price per 100.

\$3.00
3.25
3.50
3.50
3.75
4.00
4.20
4.50
4.80
5.10

BELT OR ELEVATOR BOLTS.



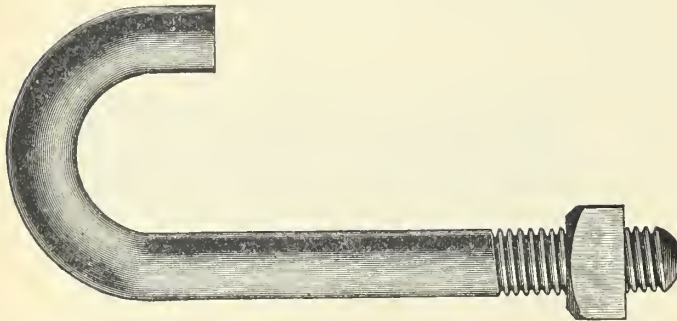
BRIDGE AND ROOF RODS.

Price per pound, with square head on one end and square nut on the other, or square nut on each end, as preferred.

Length.	5/8 Diameter.	3/4 to 1 1/8 Diameter.	1 1/4 to 1 1/2 Diameter.	1 5/8 to 2 Diameter.
20 inches to 4 feet	.09.2	.08.8	.09.2	.10.0
4 feet to 8 feet	.08.8	.08.4	.08.8	.09.4
8 feet to 12 feet	.08.4	.08.0	.08.4	.08.8
12 feet to 20 feet	.08.0	.07.6	.08.0	.08.4

We furnish the usual forgings accompanying structural bolts, such as stirrups and hanger bolts, with the necessary wrought or cast washers; also bolts with countersunk heads to fit into cast header washers, as shown in cut below.

FIG. 1000.



HOOK BOLTS.

Prices given on application

FIG. 1003.

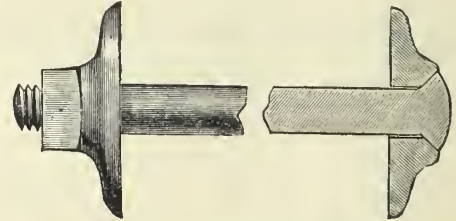
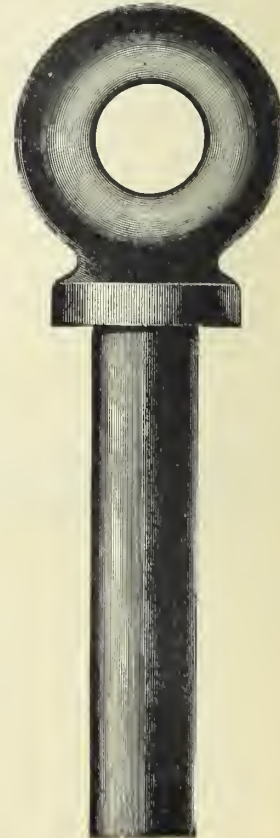


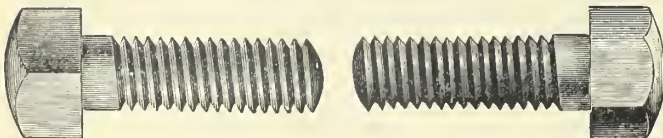
FIG. 1004.

FIG. 1005.



SPECIAL EYE BOLTS.

FIG. 1001.



FORGED SET SCREWS AND TAP BOLTS.

SQUARE HEADS.

PRICE PER 100.

Diameter of Screw.	1/4	5-16	3/8	7-16	1/2	9-16 and 5/8	3/4	7/8	1
Length.									
1 1/2	\$1.00	\$1.15	\$1.35	\$1.60	\$2.00	\$3.00	\$4.20	\$6.00	\$8.00
1 3/4	1.05	1.21	1.42	1.66	2.10	3.12	4.35	6.20	8.25
2	1.10	1.27	1.49	1.78	2.20	3.24	4.50	6.40	8.50
2 1/4	1.15	1.33	1.56	1.87	2.30	3.36	4.65	6.60	8.75
2 1/2	1.20	1.39	1.63	1.96	2.40	3.48	4.80	6.80	9.00
2 3/4	1.25	1.45	1.70	2.05	2.50	3.60	4.95	7.00	9.25
3	1.30	1.51	1.77	2.14	2.60	3.72	5.10	7.20	9.50
3 1/4		1.57	1.84	2.23	2.70	3.84	5.25	7.40	9.75
3 1/2			1.91	2.32	2.80	3.96	5.40	7.60	10.00
3 3/4				2.41	2.90	4.08	5.55	7.80	10.25
4					3.00	4.20	5.70	8.00	10.50

With Hexagon heads 10 per cent. extra.

Heads of Hexagon Tap Bolts are made finished size of United States Standard Nuts for same diameter.

We carry in stock only tap bolts milled under head, but make them from rough iron to order.

FIG. 1006.

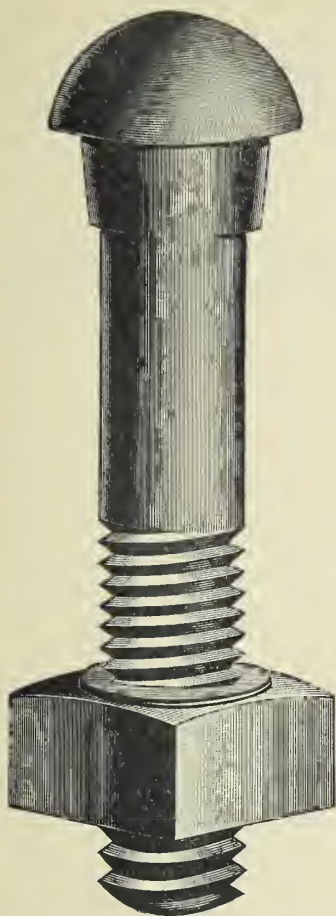
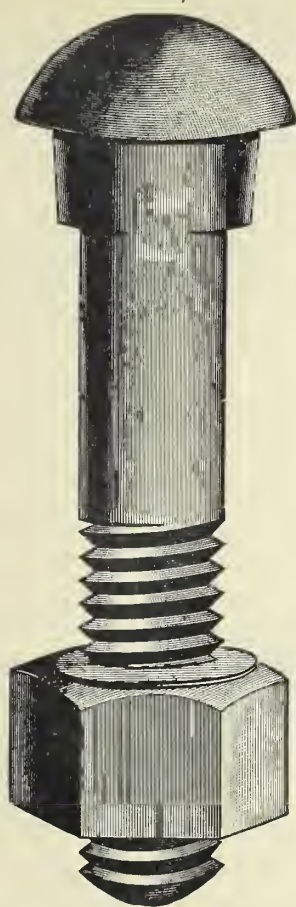


FIG. 1007.

**RAILROAD TRACK BOLTS.**

These track bolts are threaded so that nuts fit closely when screwed down to bearing.

In quoting price of track bolts, it will be understood, when not otherwise expressed, that the quotation refers to track bolts with button heads and oval necks, as per cuts.

Prices quoted on application.

FIG. 1009.

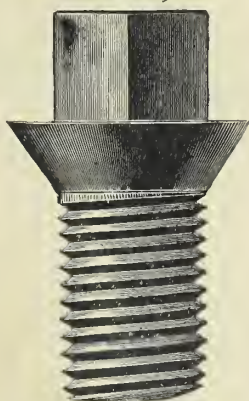


FIG. 1008.

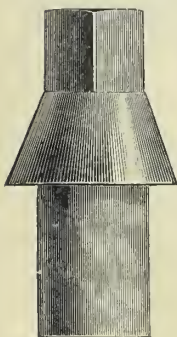
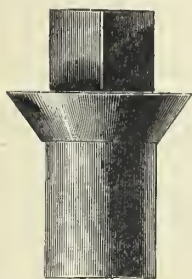


FIG. 1010.

**BOILER PATCH BOLTS.**

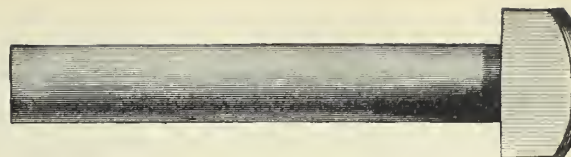
Diameter.	Milled and Threaded.	Blank Forgings.	Diameter.	Milled and Threaded.	Blank Forgings.
1/2	\$3 00	\$2 00	1	\$10 00	\$6 75
3/8	4 00	2 75	1 1/8	13 00	9 00
3/4	5 50	3 75	1 1/4	16 00	12 00
7/8	7 50	5 00			

Unless otherwise ordered, patch bolts of all diameters will be cut 12 threads to the inch.

We also furnish taps for stay bolts and patch bolts when desired.

The angle of round countersunk head in all boiler patch bolts will be 45 degrees.

FIG. 1011.

**BLANK BOLTS.**

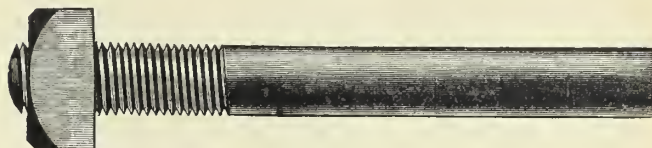
FINISHED POINTS WITH EITHER SQUARE OR ROUND HEADS.

PRICE PER 100.

Diameter.	1-4	5-16	3-8	7-16	1-2	9-16 & 5-8	3-4	7-8	1
Length in Inches.									
1 1/2	\$1 20	\$1 40	\$1 60	\$2 00	\$2 50	\$4 00	\$5 60	\$7 80	\$10 40
2	1 30	1 52	1 74	2 18	2 74	4 36	6 10	8 50	11 30
2 1/2	1 40	1 64	1 88	2 36	2 98	4 72	6 60	9 20	12 20
3	1 50	1 76	2 02	2 54	3 22	5 08	7 10	9 90	13 10
3 1/2	1 60	1 88	2 16	2 72	3 46	5 44	7 60	10 60	14 00
4	1 70	2 00	2 30	2 90	3 70	5 80	8 10	11 30	14 90
4 1/2	1 80	2 12	2 44	3 08	3 94	6 16	8 60	12 00	15 80
5	1 90	2 24	2 58	3 26	4 18	6 52	9 10	12 70	16 70
5 1/2	2 00	2 36	2 72	3 44	4 42	6 88	9 60	13 40	17 60
6	2 10	2 48	2 86	3 62	4 66	7 24	10 10	14 10	18 50
6 1/2	2 20	2 60	3 00	3 80	4 90	7 60	10 60	14 80	19 40
7	2 30	2 72	3 14	3 98	5 14	7 96	11 10	15 50	20 30
7 1/2	2 40	2 84	3 28	4 16	5 38	8 32	11 60	16 20	21 20
8	2 50	2 96	3 42	4 34	5 62	8 68	12 10	16 90	22 10
9	2 70	3 20	3 70	4 70	6 10	9 40	13 10	18 30	23 90
10	2 90	3 44	3 98	5 06	6 58	10 12	14 10	19 70	25 70
11	3 10	3 68	4 26	5 42	7 06	10 84	15 10	21 10	27 50
12	3 30	3 92	4 54	5 78	7 54	11 56	16 10	22 50	29 30
13			4 82	6 14	8 02	12 28	17 10	23 90	31 10
14			5 10	6 50	8 50	13 00	18 10	25 30	32 90
15			5 38	6 86	8 98	13 72	19 10	26 70	34 70
16			5 66	7 22	9 46	14 44	20 10	28 10	36 50
17					9 94	15 16	21 10	29 50	38 30
18					10 42	15 88	22 10	30 90	40 10
19					10 90	16 60	23 10	32 30	41 90
20					11 38	17 32	24 10	33 70	43 70

The following extras are to be understood as a part of this list: Blank Bolts with Hexagon Heads, Tee Heads, Askew Heads, and Eccentric Heads, 10 per cent. extra.

FIG. 1012.

**BOLT ENDS.**

FITTED WITH SQUARE NUTS.

Size of Iron.	Length in Inches.	Approximate Weight of 100.	List Price per Pound.
5-16	6	15 1/2	20
3-8	7	24 1/4	18
7-16	7	33 1/2	16
1-2	8	50	14
5-8	9	85	12
3-4	10	143	10
7-8	11	211	10
1	12	308	10
1 1/8	13	423	10
1 1/4	14	568	11
1 3/8	15	732	11
1 1/2	16	937	11
1 5/8	17	1162	12
1 3/4	18	1429	12
1 7/8	19	1731	12
2	20	2075	12

Upset or enlarged ends at special prices.

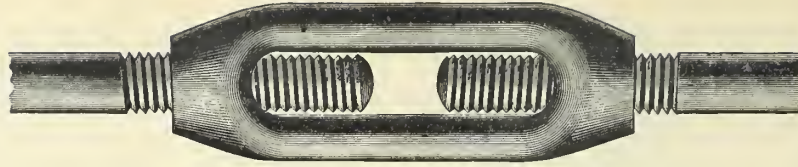
Bolt Ends with Hexagon Nuts, 10 per cent. extra.

Bolt Ends cut with right or left hand threads.

Bolt Ends ordered shorter than above Standard lengths will be charged at the price per hundred of Machine Bolts of same length, subject to same discount.

Wood Screw Ends cut to order at special prices.

FIG. 1013.

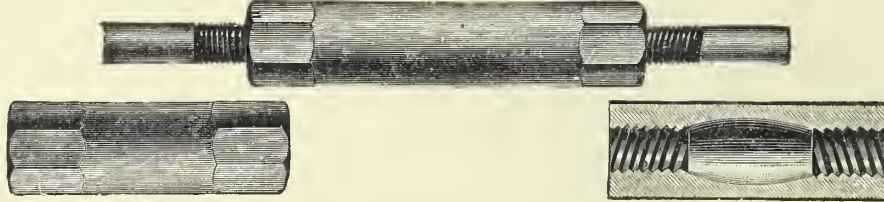
**TURNBUCKLES.**

These Turnbuckles are made without a weld, of one piece of iron and smooth finish. The ends are drilled by special machinery so that they are true in line, and threaded U. S. Standard thread.

Diameter of Stub Ends	Inside Opening of Buckle.	Outside Length of Buckle.	Total Length of Buckle with Stub Ends In	Price.
3-8 inch.	4¾ inches.	6½ inches.	17 inches.	\$0.40 each.
7-16 "	4¾ "	6½ "	17 "	.42 "
1-2 "	6 "	8 "	21 "	.45 "
5-8 "	6 "	8¼ "	23 "	.50 "
3-4 "	6 "	8½ "	23 "	.63 "
7-8 "	6 "	9 "	23 "	.75 "
1 "	6 "	9 "	23 "	.88 "
1⅛ "	6 "	9¼ "	23 "	1.00 "
1¼ "	6 "	9½ "	23 "	1.25 "
1⅜ "	6 "	9¾ "	23 "	1.38 "
1½ "	6¼ "	10½ "	25 "	1.50 "
1¾ "	6¼ "	11½ "	26 "	2.00 "

Longer Turnbuckles are made to order at special prices. Turnbuckles with swivel in one end furnished to order.

FIG. 1014.

**PIPE SWIVELS.**

With Right and Left Hand Threads and Stub Ends.

Diameter of Screw.	Length of Swivel.	Length between Nuts.	Length of Nuts.	Outside Diameter of Pipe.	Thickness of Pipe.	List Price, Each.
3-8 inch.	5 inches.	3¾ inches.	5-8 inches.	.840 inch.	.109 inch.	\$0.60
1-2 "	5½ "	3¾ "	7-8 "	1.050 "	.113 "	.80
5-8 "	7 "	4¾ "	1⅞ "	1.315 "	.134 "	1.00
3-4 "	7 "	4¾ "	1⅞ "	1.315 "	.134 "	1.25
7-8 "	8 "	5½ "	1¾ "	1.660 "	.140 "	1.50
1 "	9½ "	6½ "	1½ "	1.900 "	.145 "	2.00
1⅛ "	9½ "	6½ "	1¾ "	1.900 "	.145 "	2.50
1¼ "	11½ "	8 "	1¾ "	2.375 "	.154 "	3.00
1⅜ "	11½ "	8 "	1¾ "	2.375 "	.154 "	3.50
1½ "	13½ "	8½ "	2½ "	2.875 "	.204 "	4.00
1⅝ "	13½ "	8½ "	2½ "	2.875 "	.204 "	4.50
1¾ "	13½ "	8½ "	2½ "	2.875 "	.204 "	5.00
1⅞ "	15 "	9½ "	2¾ "	3.500 "	.217 "	5.50
2 "	15 "	9½ "	2¾ "	3.500 "	.217 "	6.00

List prices of Sleeve Nuts same as above.

AWNING HINGE.

FIG. 1015.



Size of Bolt.

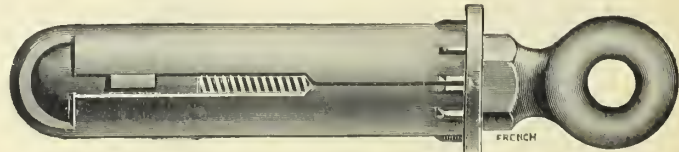
PRICE LIST PER HUNDRED.

¾	Awning Hinge, - - - -	\$20.00 per hundred.
½	Awning Hinge, - - - -	30.00 per hundred.

Discount quoted on application.

SCREW EYE.

FIG. 1016.



This cut shows a screw eye fastening for trolley wire support for electric street railroads, and guys for smoke stacks, telegraph poles, etc.

PRICE LIST PER HUNDRED.

¾	Screw Eye, - - - -	\$20.00 per hundred.
½	Screw Eye, - - - -	30.00 per hundred.

Discount quoted on application.

FIG. 1017.

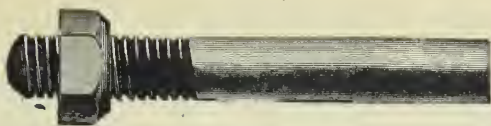
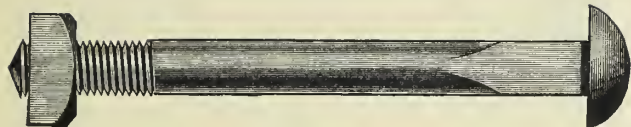


FIG. 1018.

**COMMON CARRIAGE BOLTS.**

PRICE PER 100.

Diam-eter.	1-4	5-16	3-8	7-16	1-2	9-16 & 5-8	3-4
1½	\$1 00	\$1 20					
1¾	1 04	1 25					
2	1 08	1 30					
2¼	1 12	1 35	\$1 50	\$2 20			
2½	1 16	1 40	1 64	2 36			
2¾	1 20	1 45	1 71	2 44			
3	1 24	1 50	1 78	2 52	\$3 00	\$5 00	\$7 20
3¼	1 28	1 55	1 85	2 60	3 10	5 15	7 40
3½	1 32	1 60	1 92	2 68	3 20	5 30	7 60
3¾	1 36	1 65	1 99	2 76	3 30	5 45	7 80
4	1 40	1 70	2 06	2 84	3 40	5 60	8 00
4¼	1 44	1 75	2 13	2 92	3 50	5 75	8 20
4½	1 48	1 80	2 20	3 00	3 60	5 90	8 40
4¾	1 52	1 85	2 27	3 08	3 70	6 05	8 60
5	1 56	1 90	2 34	3 16	3 80	6 20	8 80
5¼	1 64	2 00	2 42	3 24	4 00	6 50	9 20
5½	1 72	2 10	2 50	3 32	4 20	6 80	9 60
6	1 80	2 20	2 58	3 40	4 40	7 10	10 00
6¼	1 88	2 30	2 66	3 48	4 60	7 40	10 40
6½	1 96	2 40	2 74	3 56	4 80	7 70	10 80
7	2 04	2 50	2 82	3 64	5 00	8 00	11 20
7¼	2 12	2 60	2 90	3 72	5 20	8 30	11 60
7½	2 20	2 70	2 98	3 80	5 40	8 60	12 00
8	2 28	2 80	3 06	3 88	5 60	8 90	12 40
8¼	2 36	2 90	3 14	3 96	5 80	9 20	12 80
8½	2 44	3 00	3 22	4 04	6 00	9 50	13 20
9	2 52	3 10	3 30	4 12	6 20	9 80	13 60
9¼	2 60	3 20	3 38	4 20	6 40	10 10	14 00
9½	2 68	3 30	3 46	4 28	6 60	10 40	14 40
10	2 76	3 40	3 54	4 36	6 80	10 70	14 80
10¼	2 84	3 50	3 62	4 44	7 00	11 00	15 20
10½	2 92	3 60	3 70	4 52	7 20	11 30	15 60
11	3 00	3 70	3 78	4 60	7 40	11 60	16 00
11¼	3 08	3 80	3 86	4 68	7 60	11 90	16 40
11½	3 16	3 90	3 94	4 76	7 80	12 20	16 80
12	3 24	4 00	4 02	4 84	8 00	12 50	17 20
12¼	3 32	4 10	4 10	4 92	8 20	12 80	17 60
12½	3 40	4 20	4 18	5 00	8 40	13 10	18 00
13	3 48	4 30	4 26	5 08	8 60	13 40	18 40
13¼	3 56	4 40	4 34	5 16	8 80	13 70	18 80
13½	3 64	4 50	4 42	5 24	9 00	14 00	19 20
14	3 72	4 60	4 50	5 32	9 20	14 30	19 60
14¼	3 80	4 70	4 58	5 40	9 40	14 60	20 00
14½	3 88	4 80	4 66	5 48	9 60	14 90	20 40
15	3 96	4 90	4 74	5 56	9 80	15 20	20 80

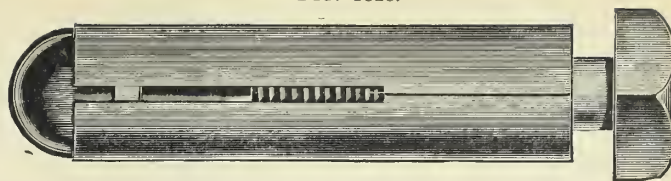
FIG. 1019.

**COMMON TIRE BOLTS.**

PRICE PER 100.

Length.	3-16	1-4	5-16	3-8
1	\$0.60	\$0.80		
1¼	.60	.80		
1½	.60	.80	\$1.10	
1¾	.65	.85	1.10	
2	.70	.90	1.17	\$2.20
2¼	.75	.95	1.24	2.30
2½	.80	1.00	1.31	2.40
2¾	.85	1.05	1.38	2.50
3	.90	1.10	1.45	2.60
3¼	.95	1.15	1.52	2.70
3½	1.00	1.20	1.59	2.80
3¾	1.05	1.25	1.66	2.90
4	1.10	1.30	1.73	3.00
4¼		1.40	1.87	3.20
4½		1.50	2.01	3.40
5			2.15	3.60
5½			2.29	3.80
6				

FIG. 1020.

**SQUARE HEADS.**

PRICE LIST PER HUNDRED.

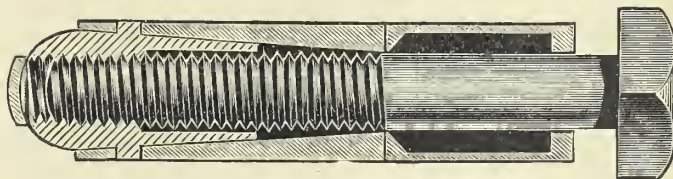
Length in Inches.	DIAMETER.						
	1-4	3-8	1-2	5-8	3-4	7-8	1
1½	8 40						
2	8 45						
2½	8 50						
3	8 55	12 10					
3½	8 60	12 20	18 69				
4	8 65	12 30	18 87	25 87	34 23		
4½	8 70	12 40	19 05	26 15	34 60	42 40	
5	8 75	12 50	19 22	26 47	34 98	42 90	54 30
5½		12 60	19 40	26 70	35 35	43 40	54 95
6		12 70	19 57	26 97	35 73	43 90	55 60
6½		12 80	19 75	27 25	36 10	44 40	56 25
7		12 90	19 92	27 52	36 48	44 90	56 90
7½		13 00	20 10	27 80	36 85	45 40	57 55
8		13 10	20 30	28 10	37 25	45 90	58 20
9			20 65	28 65	38 00	47 90	59 30
10			21 00	29 20	38 75	48 90	60 80
11			21 35	29 75	39 50	49 90	62 10
12			21 70	30 30	40 25	50 90	63 40
Length of Case...	1½	3	3¾	4	4	4½	5
Diameter of Case..	½	¾	⅞	1 1-16	1 3-16	1 5-16	1 ½

For larger sizes, see Church's Patent Compound Multiple Expansion Bolt.

Discount quoted on application.

THE PERFECT EXPANSION CASE BOLT.

FIG. 1021.

**CASE AND NUT WITHOUT BOLT.**

PRICE LIST PER HUNDRED.

Size of Bolt for Case.	Case and Nut,	-	-	-	-	-	-
¼	Case and Nut,	-	-	-	-	-	\$ 7 00 per hundred
⅜	Case and Nut,	-	-	-	-	-	10 00 per hundred
½	Case and Nut,	-	-	-	-	-	15 00 per hundred
⅝	Case and Nut,	-	-	-	-	-	20 00 per hundred
¾	Case and Nut,	-	-	-	-	-	26 00 per hundred
⅞	Case and Nut,	-	-	-	-	-	30 00 per hundred
1	Case and Nut,	-	-	-	-	-	36 00 per hundred

UNITED STATES STANDARD THREADS.

Diameter,	¼	⅜	½	⅝	¾	⅞	1
No. threads	20	16	13	11	10	9	8

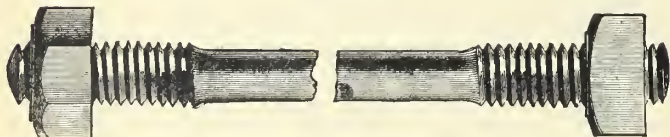
It will be understood that the diameter of the tap used is one thirty-second inch larger in all sizes.

SPECIAL SIZES OF PLATE WASHERS.

Diameter, Inches.	Size of Hole, Inches.	Thickness Wire Gauge No.	Size of Bolt, Inches.	Price Per Pound.
1/2	1/4	18	3-16	21.5
9-16	5-16	16	1/4	20.0
5/8	5-16	16	1/4	16.0
3/4	3/8	16	5-16	14.5
3/4	7-16	16	3/8	16.0
7/8	7-16	14	3/8	12.5
1	1/2	14	7-16	15.0
1	1/2	14	7-16	11.5
1 1-16	9-16	14	1/2	14.0
1 1/8	9-16	12	1/2	12.0
1 1/4	9-16	12	1/2	10.5
1 1/2	9-16	12	1/2	9.0
1 3/4	5/8	12	9-16	11.0
1 3/8	5/8	12	9-16	10.0
1 7/8	11-16	12	5/8	14.0
1 1/4	11-16	12	5/8	11.5
1 3/8	11-16	12	5/8	10.5
1 1/2	11-16	10	5/8	9.5
1 3/8	11-16	10	5/8	10.0
1 3/8	13-16	10	3/4	13.0
1 1/2	13-16	10	3/4	10.0
1 3/8	13-16	10	3/4	10.0
1 3/4	13-16	10	3/4	9.3
1 3/4	15-16	10	7/8	11.0
1 7/8	15-16	10	7/8	10.0
2	15-16	9	7/8	9.3
1 3/4	1 1-16	10	1	13.0
2	1 1-16	9	1	11.0
2 1/4	1 1-16	9	1	9.3
2	1 1/4	9	1 1/8	12.0
2 1/4	1 1/4	9	1 1/8	11.0
2 1/2	1 1/4	9	1 1/8	10.0
2 1/2	1 3/8	9	1 1/4	11.0
2 3/4	1 3/8	9	1 1/4	10.0
3	1 1/2	9	1 3/8	10.0
3 1/2	1 3/8	8	1 1/2	10.0
3 3/4	1 7/8	8	1 3/4	10.0

Washers of thinner gauges will be charged at higher prices
Washers of irregular sizes will be made at special prices.

FIG. 1022.



BRIDGE AND ROOF BOLTS.

Price per pound, in cents, with both ends upset and fitted with hexagon nuts.

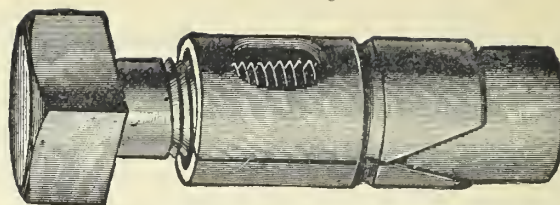
Length.	3/4 to 1 1/2 Diameter.	1 1/4 to 1 1/2 Diameter.	1 1/2 to 2 Diameter.	2 1/2 to 3 Diameter.
4 to 8 feet	.12.0	.12.4	.13.2	.14.4
8 to 12 feet	.11.0	.11.4	.12.2	.13.2
12 to 16 feet	.10.0	.10.4	.11.2	.12.4
16 to 20 feet	.09.2	.09.6	.10.4	.11.6

DIMENSIONS OF UPSET ENDS ON ROUND IRON.

Diameter of Bar.	Diameter of Upset.	Length of Upset.	Threads per Inch.	Diameter of Bar.	Diameter of Upset.	Length of Upset.	Threads per Inch.
3/4	1	2 3/4	8	1 3/4	2 1/8	5 1/2	4 1/2
7/8	1 1/8	3	7	1 7/8	2 1/4	5 3/4	4 1/2
1	1 1/4	3 1/4	7	2	2 3/8	6	4
1 1/8	1 3/8	3 1/2	6	2 1/4	2 1/2	6 1/2	4
1 1/4	1 1/2	4	6	2 1/2	2 3/4	7	4
1 3/8	1 3/4	4 1/2	5	2 3/8	2 3/4	7 1/2	3 1/2
1 1/2	1 7/8	5	4	2 1/2	2 7/8	7 1/2	3 1/2
1 3/4	2	5 1/4	5 1/2	2 5/8	3	8	3 1/2

We are prepared to make upset rods up to 3 inches diameter from best refined iron, possessing all the standard requisites as to tensile strength, elastic limit and elongation.

FIG. 1023.



SQUARE HEAD SINGLE EXPANSION BOLT.

PRICE PER HUNDRED.

Length, Inches.	DIAMETER.								
	*3-16	1-4	5-16	3-8	1-2	5-8	3-4	7-8	1
1 1/2	\$8.00	\$9.50	\$12.00	\$18.00	\$24.00				
2	8.20	9.60	12.25	18.25	24.50				
2 1/2	8.30	9.65	12.50	18.50	25.00				
3	8.40	9.75	12.50	18.50	25.00				
3 1/2	8.50	9.90	12.75	18.75	25.50				
4	8.60	10.00	13.00	19.00	26.00	\$34.50	\$43.00	\$54.00	
4 1/2	8.70	10.25	13.25	19.25	26.50	34.75	43.50	54.50	
5	8.80	10.50	13.50	19.50	27.00	35.00	44.00	55.00	
6		11.00	14.00	20.00	28.00	35.50	45.00	56.00	
7				20.50	28.75	36.00	46.00	57.00	
8				21.00	29.25	37.00	47.00	58.00	
9				21.50	30.00	38.00	48.00	59.00	
10				22.00	30.75	39.00	49.00	60.00	
11				22.75	31.50	40.00	50.00	61.00	
12				23.50	32.00	41.00	51.00	62.00	
This Size in Brass. Special Prices quoted.									
Length of Expansion.	To order	1 1/2	1 1/2 & 2	2, 3 & 4	2, 3 & 4	3 & 6	3 3/4	3 3/4	
Size Hole to Receive Expansion.		1-2	9-16	11-16	13-16	1	1 1-8	1 1-4	1 5-16

In addition to the above we furnish the following sizes: 1/4, 1 1/2, 1 3/4, 2 inches in diameter, any length.

Thickness of metal to be fastened should always be stated when ordering bolts.

The size of a bolt is always understood to be the diameter of the iron of which it is made, not of the Expansion Parts.

FIG. 1024.



SQUARE HEAD DOUBLE EXPANSION BOLT.

PRICE PER HUNDRED.

Length, Inches.	DIAMETER.							
	1-4	5-16	3-8	1-2	5-8	3-4	7-8	1
2	\$9.00	\$11.00	\$12.30		\$26.50			
2 1/2	9.05	11.05	12.40	\$19.85	27.00			
3	9.10	11.10	12.50	20.00	27.50			
3 1/2	9.15	11.15	12.60	20.15	27.75			
4	9.20	11.20	12.70	20.30	27.80	\$42.00		
4 1/2	9.25	11.25	12.80	20.45	27.75	42.30		
5	9.30	11.30	12.90	20.60	28.00	42.60	\$62.00	\$83.90
5 1/2	9.35	11.35	13.00	20.75	28.25	42.90	62.43	84.45
6	9.40	11.40	13.10	20.90	28.50	43.20	62.86	85.00
6 1/2			13.20	21.05	28.75	43.50	63.29	85.55
7			13.30	21.20	29.00	43.80	63.72	86.10
7 1/2			13.40	21.35	29.25	44.10	64.15	86.65
8			13.50	21.50	29.50	44.40	64.58	87.20
9				21.65	29.75	44.70	65.01	87.75
10				21.80	30.00	45.00	65.44	88.30
Length of Expansion.	1 1/2	1 7/8	2 3/8	2 3/4	3	4	4 1/4	5
Size Hole to Receive Expansion.	7-16	9-16	3-4	7-8	1	1 3-16	1 3-8	1 5-8

SQUARE AND HEXAGON NUTS.

HOT PRESSED AND REAMED.

FIG. 1025.

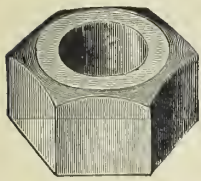
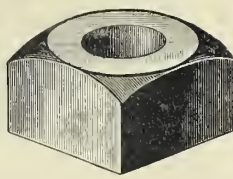


FIG. 1026.



Plain cold punched nuts are sold at same list prices as reamed nuts.

Reamed nuts are guaranteed not to wear taps any more rapidly than cold punched nuts.

Short Diameter.	Thickness.	Hole.	Size of Bolt.	Square.		Hexagon.	
				Price per Pound.	Price per Pound.	Price per Pound.	Price per Pound.
				Hot Pressed	Reamed	Hot Pressed	Reamed
1-2	1-4	.185=	3 16 scant	1-4	13.0	13.8	20.0
19-32	5-16	.240=	1-4 scant	5-16	12.0	12.8	18.0
11-16	3-8	.294=	19-64 scant	3-8	10.5	11.0	14.0
25-32	7-16	.344=	11-32	7-16	10.0	10.5	13.0
7-8	1-2	.400=	13-32 scant	1-2	9.0	9.3	11.2
31-32	9-16	.454=	29-64	9-16	9.0	9.3	11.2
1 1-16	5-8	.507=	1-2 full	5-8	8.7	8.9	10.5
1 1-4	3-4	.620=	5-8 scant	3-4	8.5	8.6	10.0
1 7-16	7-8	.731=	47-64 scant	7-8	8.4	8.6	9.9
1 5-8	1	.837=	27-32 scant	1	8.2	8.4	9.7
1 13-16	1 1-8	.940=	15-16 full	1 1-8	8.2	8.4	9.7
2	1 1-4	1.065=	1-16 full	1 1-4	8.4	8.8	9.9
2 3-16	1 3-8	1.160=	1 5-32 full	1 3-8	8.5	8.8	10.0
2 3-8	1 1-2	1.284=	1 9-32 full	1 1-2	8.8	9.6	10.3
2 9-16	1 5-8	1.389=	1 25-64 scant	1 5-8	9.0	9.6	10.5
2 3-4	1 3-4	1.491=	1-2 scant	1 3-4	9.3	10.2	10.8
2 15-16	1 7-8	1.616=	1 5-8 scant	1 7-8	9.5	10.2	11.0
3 1-8	2	1.712=	1 23-32 scant	2	9.7	10.6	11.2
3 5-16	2 1-8	1.836=	1 27-32 scant	2 1-8	10.0	11.0	11.7
3 1-2	2 1-4	1.962=	1 31-32 scant	2 1-4	10.0	11.5	11.7
3 11-16	2 3-8	2.086=	2 5-64 scant	2 3-8	10.3	12.0	12.2
3 7-8	2 1-2		2 3-16	2 1-2	10.5	12.2	12.4
4 1-4	2 3-4		2 7-16	2 3-4	10.8	12.5	12.7
4 5-8	3		2 11-16	3	11.0	12.7	12.9

FIG. 1027.



WEDGE HEAD DOUBLE EXPANSION SCREW BOLT.

MADE WITH OUR IMPROVED 1893 PATTERN.

PRICE PER 100.

Length, over all.	DIAMETER.							
	1-4	5-16	3-8	1-2	5-8	3-4	7-8	1
2	\$12 75	\$14 20						
2½	13 00	14 25	\$17 40					
3	13 05	14 30	17 50	\$25 50	\$33 00			
3½	13 10	14 40	17 60	25 75	33 20			
4	13 20	14 50	17 70	26 00	33 40	\$48 00		
4½		14 60	17 80	26 25	33 60	48 25		
5		14 70	17 90	26 50	33 80	48 50	\$68 00	\$88 00
5½		14 75	17 95	26 60	34 00	48 75	68 50	88 50
6		14 80	18 00	26 70	34 20	49 00	69 00	89 00
6½			18 10	26 80	34 40	49 25	69 50	89 50
7			18 20	26 90	34 60	49 50	70 00	90 00
7½			18 25	27 10	34 80	49 75	70 50	90 50
8			18 30	27 20	35 00	50 00	71 00	91 00
9			18 40	27 30	35 20	50 50	71 50	91 50
10			18 50	27 40	35 40	51 00	72 00	92 20
Length of Expansion.	1½	1¾	2¾	2¾	3	4	4¾	5
Size Hole to Receive Expansion.	7-16	9-16	3-4	7-8	1	1 3-16	1 3-8	1 5-8

FIG. 1028.

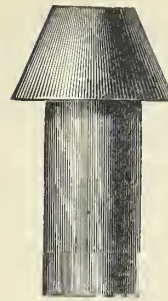
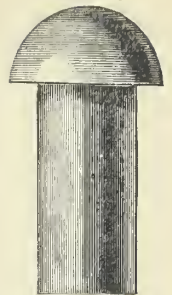


FIG. 1029.



BOILER RIVETS.

AVERAGE NUMBER OF CONE-HEAD BOILER RIVETS IN 100 POUNDS.

Length.	Diameter.				Length.	Diameter.			
	½	¾	1 1/8	¾		½	¾	1 1/8	¾
¾	1092	665			¾	433	267	212	180
7/8	1027	597			½	413	248	201	169
1	940	538	450		¾	395	241	192	160
1 1/8	840	512	415		4		230	184	158
1 ¼	797	487	389	356	¾		220	177	150
1 ½	760	460	370	329	½		210	171	146
1 ¾	730	440	357	280	¾		200	166	138
2	711	420	340	271	5		190	161	135
2 ¼	693	390	325	262	1 ¼		180	156	130
2 ½	648	375	312	257	½		172	151	124
2 ¾	608	360	297	243	¾		164	145	120
3	573	354	289	237	6		157	140	115
	555	347	280	232	¼		150	138	111
	525	335	260	220	½		146	134	107
	500	312	242	208	¾		143	129	104
	460	290	224	197	7		140	125	100

BRIDGE RIVETS.

We also make Bridge Rivets of excellent quality, suited to the work, for which prices will be named on receipt of inquiry, with specifications.

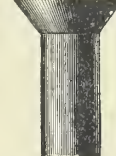
TANK RIVETS OF NORWAY IRON.

FIG. 1030.



ROUND HEAD.

FIG. 1031.



COUNTERSUNK HEAD.

FIG. 1032.



FLAT HEAD.

IRON RIVETS IN BULK.

PRICE PER POUND.

Size.	Length of Rivets.															
	½	1 1/8	7/8	1 1/8	3/8	1 1/8	5/8	3/4	7/8	1 1/8	5/8	1 1/8	3/4	7/8	1 1/8	3/4
1 1/8	12	12	12	12 ½	13	13										
¾	12 ½	12 ½	12 ½	13	13	13										
1	12 ½	12 ½	12 ½	13	13	13	14									
2	12 ½	12 ½	12 ½	13	13	13	14	15	15	15						
3	12 ½	13	13	14	14	14	15	15	15	15	16	16	16	17	17	18
1 ¼	12 ½	13	13	14	14	14	15	15	15	15	16	16	16	17	17	18
4	12 ½	14	14	15	15	15	16	16	16	16	17	17	17	18	18	19
5	14	15	16	16	16	17	17	17	17	17	18	18	18	19	19	20
6	14	15	16	16	16	17	17	17	17	17	18	18	18	19	19	20
1 1/8	14	15	16	16	16	17	17	17	17	17	18	18	18	19	19	20
7	15	16	17	17	17	17	17	17	17	17	18	18	18	19	19	20
8	16	16	17	17	17	17	17	17	17	17	18	18	18	19	19	20
9	18	19	19	20	20	20	21	21	21	21	21	21	21	22	22	23
10	19	20	21	22	22	22	23	23	23	23	23	23	23	24	24	25
11	20	22	24	26	27	28	30	31	31	31	31	31	31	32	32	33
12	21	24	26	28	29	30	32	34	35	36	36	36	36	37	37	38
13	25	27	30	33	34	35	37	39	40	41	41	41	41	42	42	43
14	27	30	35	38	40	45	50	52	54	56	58	60	63	65	65	65

Rivets made from smaller wire than No. 14, all lengths, 70 cents per pound.

SQUARE AND HEXAGON NUTS.

CHAMFERED AND TRIMMED WITH DRILLED HOLES.

Wide.	Thick.	Hole.	Bolt.	Square. Price per Pound.	Hexagon. Price per Pound.
1-2	1-4	13-64	1-4	20.0	27.0
19-32	5-16	1-4	5-16	18.0	24.0
11-16	3-8	19-64	3-8	14.5	18.5
25-32	7-16	11-32	7-16	14.0	18.0
7-8	1-2	25-64	1-2	11.3	14.0
31-32	9-16	29-64	9-16	11.3	14.0
1 1-16	5-8	33-64	5-8	10.0	12.5
1 1-4	3-4	5-8	3-4	9.4	10.9
1 7-16	7-8	47-64	7-8	9.4	10.9
1 5-8	1	27-32	1	9.4	10.9
1 13-16	1 1-8	15-16	1 1-8	9.4	10.9
2	1 1-4	1 1-16	1 1-4	10.1	11.5
2 3-16	1 3-8	1 5-32	1 3-8	10.3	12.0
2 3-8	1 1-2	1 9-32	1 1-2	10.7	12.6
2 9-16	1 5-8	1 13-32	1 5-8	11.1	13.2
2 3-4	1 3-4	1 1-2	1 3-3	11.5	14.0
2 15-16	1 7-8	1 5-8	1 7-8	12.0	14.5
3 1-8	2	1 23-32	2	12.0	14.5
3 5-16	2 1-8	1 27-32	2 1-8	12.5	15.0
3 1-2	2 1-4	1 61-64	2 1-4	12.5	15.0
3 7-8	2 1-2	2 3-16	2 1-2	13.5	16.0
4 1-4	2 3-4	2 7-16	2 3-4	14.0	16.5
4 5-8	3	2 11-16	3	14.5	17.0

SQUARE NUTS.

Short Diameter.	Thickness.	Hole.	Size of Bolt.	Hot Pressed. Price per Pound.	Reamed. Price per Pound.
1-2	1-4	7-32	1-4	13.0	13.8
5-8	5-16	9-32	5-16	11.5	12.3
3-4	3-8	11-32	3-8	10.0	10.8
7-8	7-16	13-32	7-16	9.0	9.3
1	1-2	7-16	1-2	8.7	9.0
1 1-8	9-16	1-2	9-16	8.5	8.8
1 1-4	5-8	9-16	5-8	8.4	8.5
1 1-2	3-4	21-32	3-4	8.2	8.3
1 3-4	7-8	25-32	7-8	8.1	8.2
2	1	7-8	1	8.1	8.2
2 1-4	1 1-8	15-16	1 1-8	8.1	8.2
2 1-2	1 1-4	1 1-16	1 1-4	8.2	8.6
2 3-4	1 3-8	1 3-16	1 3-8	8.4	8.6
3	1 1-2	1 5-16	1 1-2	8.6	9.2
3 1-4	1 5-8	1 7-16	1 5-8	8.8	9.4
3 1-2	1 3-4	1 9-16	1 3-4	9.0	9.8
3 3-4	1 7-8	1 11-16	1 7-8	9.1	10.0
4	2	1 13-16	2	9.2	
4	2 1-8	1 7-8	2 1-8	9.4	
4 1-4	2 1-4	2	2 1-4	9.6	

Sizes not enumerated on these lists will be charged extra at discretion of the manufacturer.

HEXAGON NUTS.

Short Diameter.	Thickness.	Hole.	Size of Bolt.	Hot Pressed. Price per Pound.	Reamed. Price per Pound.
1-2	1-4	7-32	1-4	20.0	21.0
5-8	5-16	9-32	5-16	16.0	17.5
3-4	3-8	11-32	3-8	13.0	13.8
7-8	7-16	13-32	7-16	11.2	11.5
1	1-2	7-16	1-2	10.5	11.0
1 1-8	9-16	1-2	9-16	10.3	10.6
1 1-4	5-8	9-16	5-8	10.0	10.1
1 3-8	3-4	21-32	3-4	9.8	10.1
1 5-8	7-8	25-32	7-8	9.6	9.7
1 3-4	1	7-8	1	9.6	9.7
2	1 1-4	15-16	1 1-8	9.6	9.7
2 1-4	1 3-8	1 1-16	1 1-4	9.8	10.1
2 1-2	1 1-2	1 3-16	1 3-8	10.0	10.1
2 3-4	1 5-8	1 5-16	1 1-2	10.2	10.3
3	1 3-4	1 7-16	1 5-8	10.5	10.9
3 1-4	1 7-8	1 9-16	1 3-4	10.7	11.2
3 1-2	2	1 11-16	1 7-8	10.8	12.5
3 1-2	2 1-8	1 13-16	2	11.0	12.5
3 3-4	2 1-8	1 7-8	2 1-8	11.3	12.8
3 3-4	2 1-4	2	2 1-4	11.5	12.8

Sizes not enumerated on these lists will be charged extra.

HOT PRESSED SQUARE AND HEXAGON NUTS.

NARROW GAUGE SIZES AND "P" SIZES.

Short Diameter.	DIMENSIONS.			SQUARE. Price Per 100 Pounds.	HEXAGON. Price Per 100 Pounds.
	Thickness.	Hole.	Size of Bolt.		
Inches.	Inches.	Inches.	Inches.		
1 1-8	5-8	3-8	1-8	\$35.00	
1 3-8	1-2	1-2	1-2	20.00	
1 5-8	3-4	3-4	3-4	13.70	
1 7-8	7-8	7-8	7-8	12.30	
P 1-8	1-8	1-8	1-8	11.50	\$16.00
P 1-4	1-4	1-4	1-4	10.70	14.00
P 3-8	3-8	3-8	3-8	10.00	13.00
P 1-2	1-2	1-2	1-2	9.00	11.20
P 1	1	1	1	8.70	10.50
P 1 1-8	1 1-8	1 1-8	1 1-8	8.50	10.30
P 1 1-4	1 1-4	1 1-4	1 1-4	8.50	10.10
P 1 3-8	1 3-8	1 3-8	1 3-8	8.35	
P 1 1-2	1 1-2	1 1-2	1 1-2	8.40	9.80
P 1 5-8	1 5-8	1 5-8	1 5-8	8.15	9.60
P 1 7-8	1 7-8	1 7-8	1 7-8	8.25	9.80
P 1 3-4	1 3-4	1 3-4	1 3-4	8.15	9.60
P 2	2	2	2	8.15	9.60
P 2 1-4	2 1-4	2 1-4	2 1-4	8.30	9.80
P 2 1-2	2 1-2	2 1-2	2 1-2	8.40	10.00
P 2 3-4	2 3-4	2 3-4	2 3-4	8.60	10.20

Joint or oblong nuts, stirrup nuts, round nuts, double cupped nuts, extra thick and other odd styles of nuts made to order at special prices.

Several of the "P" or light sizes are identical with the "narrow gauge" sizes; those which are "P" sizes are so marked in the "short diameter" column.

FIG. 1033.

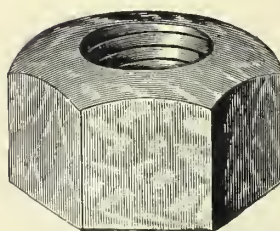


FIG. 1034.

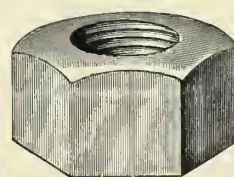
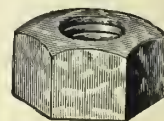


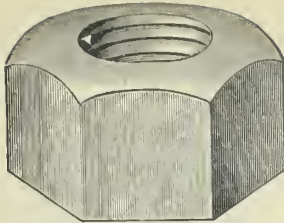
FIG. 1035.



TAPPING SQUARE AND HEXAGON NUTS.

Size of Bolt.	Threads to Inch.	Square Nuts. Price Per Pound.	Hexagon Nuts. Price Per Pound.	U. S. S. Square Nuts. No. in 100 Pounds.	U. S. S. Hexagon Nuts. No. in 100 Pounds.
1/4	20	6.0	9.0	8500	9500
1/8	18	4.5	7.0	5000	6000
3/8	16	3.7	6.0	3000	3300
1/2	14	3.0	4.5	2000	2300
5/8	13 or 12	2.5	3.5	1300	1650
3/4	12	2.1	2.8	1000	1230
7/8	11	1.6	2.3	710	840
1	10	1.3	2.0	410	520
1 1/8	9	1.2	1.8	285	340
1 1/4	8	1.2	1.8	188	231
1 3/8	7	1.2	1.8	142	165
1 1/2	7	1.5	2.2	101	122
1 3/4	6	1.5	2.2	75	90
1 7/8	6	1.5	2.2	62	74
2	5 1/2	2.2	2.7	48	58
2 1/8	5	2.2	2.7	38	46
2 1/4	5	2.5	3.2	31	38
2 3/8	4 1/2	3.0	4.0	21	26
2 1/2	4 1/2	3.0	4.0	18 1/2	21 1/2
2 3/4	4	3.5	4.5	12 1/2	15 1/2
3	4	3.5	4.5	9 1/2	11 1/2
3 1/4	3 1/2	3.5	4.5	7 3/4	9
3 1/2	3 1/2	4.0	5.0	6 1/4	7 1/2
3 3/4	3 1/2	4.0	5.0	5 1/4	6 1/4

FIG. 1036.



HEXAGON NUTS.

FINISHED CASE HARDENED AND SEMI-FINISHED.

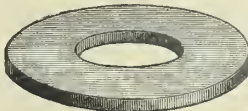
The thread and outside of each of finished case hardened nuts are made to an accurate gauge, and to the standard adopted by the U. S. Government.

The semi-finished nuts are the regular Chamfered and trimmed United States Standard Hexagon Nuts, tapped and faced true on the bottom.

For Bolt.	Width.	Thick-	No. of	Finished	Semi-	Semi-
Inches.	Inches.	ness.	Threads.	Case	Finished	Finished,
		Inches.	Inches.	Nuts.	Nuts.	with Double
				Price Each.	Price Each.	Chamfer.
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	20	.06	.02	.02 $\frac{1}{2}$
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	18	.07	.02 $\frac{1}{2}$	.03
$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	16	.08	.03 $\frac{1}{4}$	.04
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	14	.09	.03 $\frac{3}{4}$	.04 $\frac{1}{2}$
$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	13 or (12)	.10	.04	.04 $\frac{3}{4}$
$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	12	.12	.05	.06
$\frac{3}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	11	.15	.05 $\frac{1}{2}$	.06 $\frac{1}{2}$
$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{4}$	11	.17	.06 $\frac{1}{2}$	.07 $\frac{3}{4}$
$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{8}$	10	.18	.07 $\frac{1}{2}$	.08 $\frac{3}{4}$
$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{16}$	9	.22	.10	.11 $\frac{1}{2}$
$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{32}$	8	.30	.13 $\frac{1}{2}$	.15 $\frac{1}{2}$
$\frac{1}{64}$	$\frac{1}{128}$	$\frac{1}{64}$	7	.35	.17	.19 $\frac{1}{2}$
$\frac{1}{128}$	$\frac{1}{256}$	$\frac{1}{128}$	7	.45	.24	.27
$\frac{1}{256}$	$\frac{1}{512}$	$\frac{1}{256}$	6	.55	.34	.38
$\frac{1}{512}$	$\frac{1}{1024}$	$\frac{1}{512}$	6	.65	.44	.48
$\frac{1}{1024}$	$\frac{1}{2048}$	$\frac{1}{1024}$	5 $\frac{1}{2}$	.80	.54	.60
$\frac{1}{2048}$	$\frac{1}{4096}$	$\frac{1}{2048}$	5	1.00	.70	.78
$\frac{1}{4096}$	$\frac{1}{8192}$	$\frac{1}{4096}$	5	1.50	.90	1.00
$\frac{1}{8192}$	$\frac{1}{16384}$	$\frac{1}{8192}$	4 $\frac{1}{2}$	2.00	1.10	1.25
$\frac{1}{16384}$	$\frac{1}{32768}$	$\frac{1}{16384}$	4 $\frac{1}{2}$	3.50	1.50	1.80

Finished nuts, not case hardened, at a reduction of 5 per cent. from list prices; polished, not case hardened, at regular rates Polished, after case hardening, 10 per cent. less discount. Case hardened semi-polished nuts, 5 per cent. less discount.

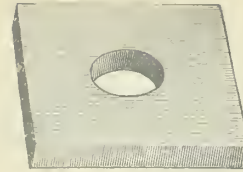
FIG. 1037.



WROUGHT OR STEEL WASHERS.

Diameter.	Size of Hole.	Thickness. Wire Gauge.	Size of Bolt.	Price per Pound.	Average Number in 100 Pounds.
9-16	$\frac{1}{4}$	18	3-16	18.0	44,075
$\frac{3}{4}$	5-16	16	$\frac{1}{4}$	12.5	13,845
$\frac{7}{8}$	$\frac{3}{8}$	16	5-16	11.5	11,220
1	7-16	14	$\frac{3}{8}$	10.5	6,573
$1\frac{1}{4}$	$\frac{1}{2}$	14	7-16	9.5	4,261
$1\frac{3}{8}$	9-16	12	$\frac{1}{2}$	9.0	2,683
$1\frac{1}{2}$	$\frac{5}{8}$	12	9-16	9.0	2,249
$1\frac{3}{4}$	11-16	10	$\frac{5}{8}$	8.5	1,315
2	13-16	10	$\frac{3}{4}$	8.5	1,013
$2\frac{1}{4}$	15-16	9	$\frac{7}{8}$	8.5	858
$2\frac{1}{2}$	1-1-16	9	1	8.5	617
$2\frac{3}{4}$	$1\frac{1}{4}$	9	$1\frac{1}{8}$	8.5	516
3	$1\frac{3}{8}$	9	$1\frac{1}{4}$	8.5	403
$3\frac{1}{4}$	$1\frac{1}{2}$	8	$1\frac{3}{8}$	9.0	320
$3\frac{1}{2}$	$1\frac{5}{8}$	8	$1\frac{1}{2}$	9.0	278
$3\frac{3}{4}$	$1\frac{3}{4}$	8	$1\frac{5}{8}$	9.0	247
4	$1\frac{7}{8}$	8	$1\frac{3}{4}$	9.0	224
$4\frac{1}{4}$	2	8	$1\frac{7}{8}$	9.0	200
$4\frac{1}{2}$	$2\frac{1}{8}$	8	2	9.0	180
$4\frac{3}{4}$	$2\frac{3}{8}$	6	$2\frac{1}{4}$	9.5	110
5	$2\frac{5}{8}$	6	$2\frac{1}{2}$	9.5	91

FIG. 1038.



SQUARE WASHERS.

STANDARD SIZES.

Width.	Thick.	Hole.	Bolt.	Price per Pound.	Number in 100 Pounds.
$1\frac{1}{2}$	$\frac{1}{8}$	7-16	$\frac{3}{8}$	9.6	1,300
$1\frac{3}{4}$	$\frac{1}{8}$	$\frac{1}{2}$	7-16	9.1	1,100
2	$\frac{1}{4}$	9-16	$\frac{1}{2}$	8.5	500
$2\frac{1}{4}$	$\frac{1}{4}$	23-32	$\frac{5}{8}$	8.3	315
$2\frac{1}{2}$	$\frac{1}{4}$	27-32	$\frac{3}{4}$	8.2	250
3	$\frac{1}{4}$	31-32	$\frac{7}{8}$	8.1	165
$3\frac{1}{2}$	$\frac{3}{8}$	1-3-32	1	8.1	87
4	$\frac{3}{8}$	$1\frac{1}{4}$	$1\frac{1}{8}$	8.1	65
$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{1}{4}$	8.1	48
5	$\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{8}$	8.2	40
6	$\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{1}{2}$	8.3	28

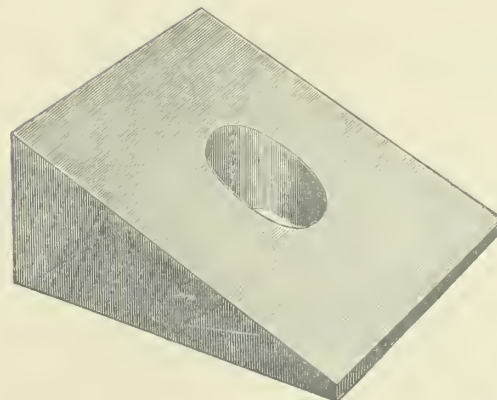
CAST WASHERS.

FIG. 1039.

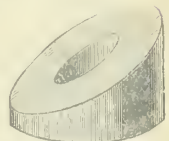


ROUND WASHER.

FIG. 1040.



SQUARE BEVELED.



ROUND BEVELED.

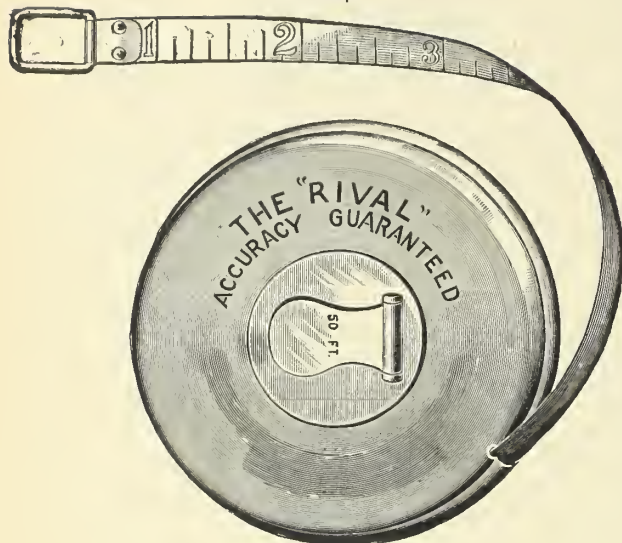
We are prepared to furnish any style of Cast Washers on receipt of pattern or description.

Regular sizes carried in stock.

Prices quoted on application.

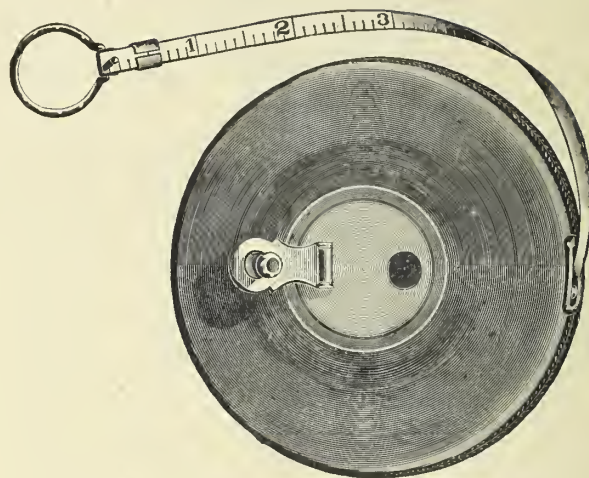
STEEL MEASURING TAPES.

FIG. 1042.



RIVAL.

FIG. 1043.



PAINE'S PATTERN.

Nickel plated steel cases, flush handle, $\frac{3}{8}$ inch tapes, marked one side only, in tenths or twelfths.

Marked Feet and Twelfths (Inches and Eights).	Marked feet, Tenths and 100ths of Feet for Surveyors' Use.	Lengths.	Diameter of Case.	Dozen.
No. 240	No. 240 D	25 feet	2 $\frac{3}{4}$ inches	\$39.00
No. 243	No. 243 D	50 feet	3 $\frac{1}{4}$ inches	48.00
No. 245	No. 245 D	75 feet	3 $\frac{3}{4}$ inches	63.00
No. 246	No. 246 D	100 feet	4 $\frac{1}{4}$ inches	81.00

With $\frac{1}{4}$ inch tapes; hard leather cases, nickel plated trimmings, two detachable rings. The tape can be readily detached from the case, and we furnish an extra ring for the other end. The steel is heavier and stronger than used in the regular steel tapes, and the cases are thinner. Marked on one side in tenths or twelfths.

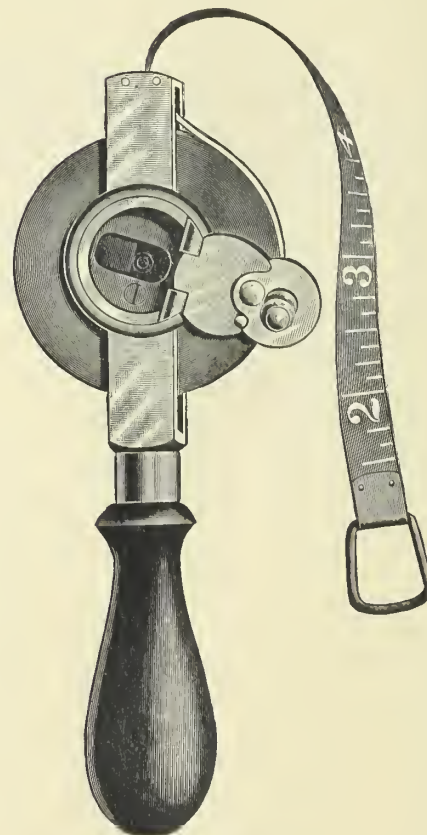
Marked feet and Twelfths (Inches and Eights).	Marked feet, Tenths and 100ths of Feet for Surveyors' Use.	Lengths.	Diameter of Case.	Each.
No. 233	No. 233 D	50 feet	3 $\frac{3}{4}$ inches	\$6.00
No. 234	No. 234 D	66 feet	4 $\frac{1}{2}$ inches	8.00
No. 235	No. 235 D	75 feet	4 $\frac{1}{2}$ inches	9.50
No. 236	No. 236 D	100 feet	5 inches	12.00

With $\frac{1}{2}$ inch steel tapes, nickel plated frames and trimmings and our patent double folding flush handle, opened by pressing small pin or button on opposite side.

Marked either in 10ths or 12ths and links on back.

Marked Feet and Twelfths (Inches and Eights).	Marked Feet, Tenths and 100ths of Feet for Surveyors' Use.	Lengths.	Each.
No. 323	No. 323 D	50 feet	\$7.50
No. 324	No. 324 D	66 feet	9.50
No. 325	No. 325 D	75 feet	11.50
No. 326	No. 326 D	100 feet	13.50

FIG. 1044.



RELIABLE.

METALLIC MEASURING TAPES.

FIG. 1045.

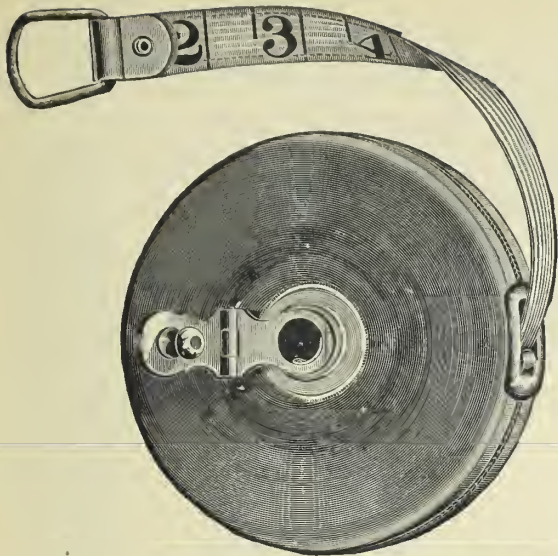
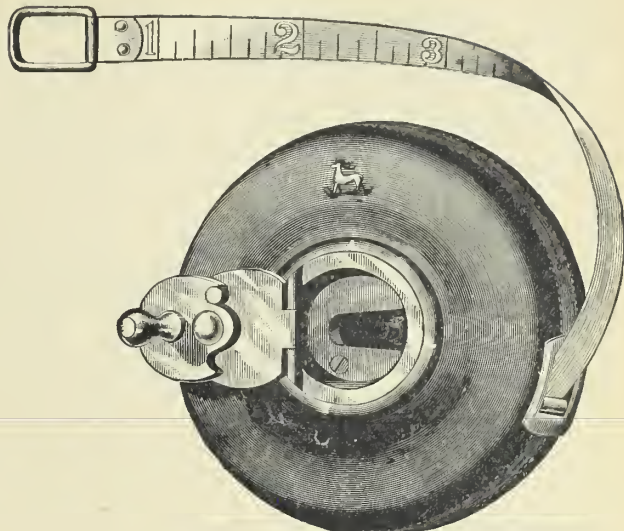


FIG. 1046.



FLUSH HANDLE.

Tape $\frac{5}{8}$ inch wide, made of the best woven linen with metallic warp. Hard leather cases, folding handles with brass trimmings. These goods are guaranteed strictly first class, and form, in connection with our line of steel tapes, the best and most complete line of high grade measuring tapes made.

MARKED ONE SIDE ONLY.

Length, -	25 ft.	33 ft.	40 ft.	50 ft.	66 ft.	75 ft.	100 ft.
12ths, No.	500	501	502	503	504	505	506
Price, per doz.,	\$20 40	24 00	26 40	30 00	33 60	37 20	46 80

MARKED BOTH SIDES.

Length, -	25 ft.	33 ft.	40 ft.	50 ft.	66 ft.	75 ft.	100 ft.
12ths & Links, No.	500L	501L	502L	503L	504L	505L	506L
Price, per dozen,	\$21 60	25 20	27 60	31 20	36 00	39 60	50 40

10ths & Links, No.	500DL	501DL	502DL	503DL	504DL	505DL	506DL
Price, per dozen,	\$21 60	25 20	27 60	31 20	36 00	39 60	50 40

MARKED ONE SIDE ONLY.

Length, -	25 ft.	33 ft.	40 ft.	50 ft.	66 ft.	75 ft.	100 ft.
12ths, No.	600	601	602	603	604	605	606
Price, per dozen,	\$24 00	27 60	30 00	33 60	37 20	40 80	50 40

MARKED BOTH SIDES.

Length, -	25 ft.	33 ft.	40 ft.	50 ft.	66 ft.	75 ft.	100 ft.
12ths & Links, No.	600L	601L	602L	603L	604L	605L	606L
Price, per dozen,	\$25 20	28 80	31 20	34 80	39 60	43 20	54 00

10ths & Links, No.	600DL	601DL	602DL	603DL	604DL	605DL	606DL
Price, per dozen,	\$25 20	28 80	31 20	34 80	39 60	43 20	54 00

BOXWOOD RULES.

FIG. 1047.

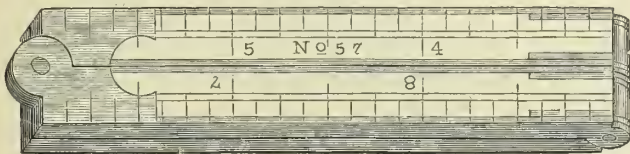
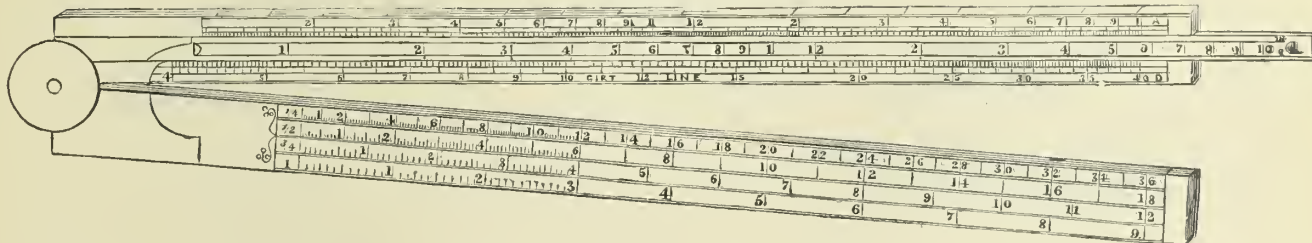


FIG. 1048



ONE FOOT, FOUR FOLD, NARROW.

FIG. 1049.

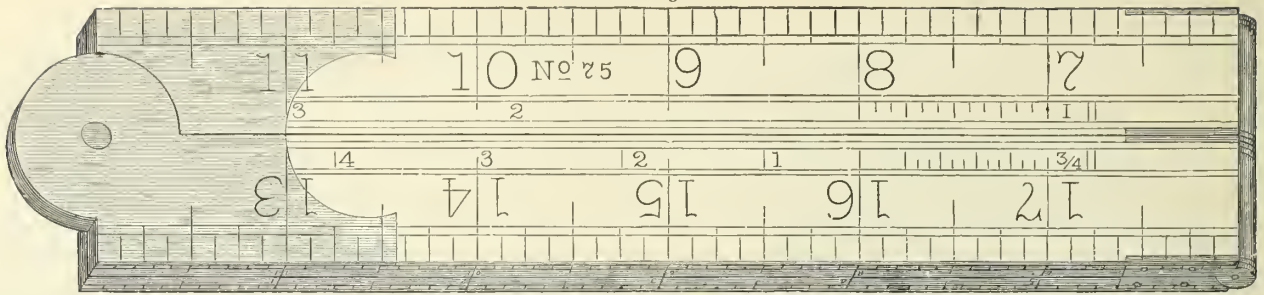


TWO FEET, TWO FOLD, SLIDE RULES.

No.	Description	Per Doz.
26.	Square joint, slide, 8ths, 10ths and 16ths of inches, octagonal scales, $1\frac{1}{2}$ inches wide, - - - - -	\$9 00
27.	Square joint bitted, Gunter's slide, 8ths, 10ths and 16ths of inches, 100ths of a foot, drafting and octagonal scales, $1\frac{1}{2}$ in. wide, - - - - -	12 00
12.	Arch joint, bitted, Gunter's slide, 8ths, 10ths and 16ths of inches, 100ths of a foot, drafting and octagonal scales $1\frac{1}{2}$ in. wide, - - - - -	14 00
15.	Arch joint, bound, Gunter's slide, 8ths, 10ths and 16ths of inches, drafting and octagonal scales, $1\frac{1}{2}$ inches wide, - - - - -	24 00
6.	Arch joint, bitted, Gunter's slide, engineering, 8ths, 10ths and 16ths of inches, 100ths of a foot, octagonal scales, $1\frac{1}{2}$ in. wide, - - - - -	18 00
16.	Arch joint, bound, Gunter's slide, engineering, 8ths, 10ths and 16ths of inches, octagonal scales, $1\frac{1}{2}$ inches wide, - - - - -	28 00

BOXWOOD RULES.—Continued.

FIG. 1050.



TWO FEET, FOUR FOLD, BROAD RULES.

No.	Description	Per Doz.
69.	Round joint, middle plates, 8ths and 16ths of inches, $\frac{5}{8}$ inch wide, - - - - -	\$ 3 00
65.	Square joint, middle plates, 8ths and 16ths of inches, $\frac{5}{8}$ inch wide, - - - - -	3 50
64.	Square joint, edge plates, 8ths and 16ths of inches, $\frac{5}{8}$ inch wide, - - - - -	5 00
65½.	Square joint, bound, 8ths and 16ths of inches, $\frac{5}{8}$ inch wide, - - - - -	11 00
55.	Arch joint, middle plates, 8ths and 16ths of inches, $\frac{5}{8}$ inch wide, - - - - -	4 00
56.	Arch joint, edge plates, 8ths and 16ths of inches, $\frac{5}{8}$ inch wide, - - - - -	6 00
57.	Arch joint, bound, 8ths and 16ths of inches, $\frac{5}{8}$ inch wide, - - - - -	12 00

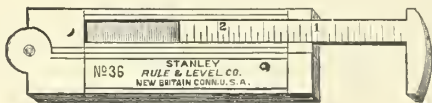
TWO FEET, FOUR FOLD, EXTRA NARROW.

61½.	Square joint, middle plates, 8ths and 16ths of inches, $\frac{3}{4}$ inch wide, - - - - -	5 50
63½.	Square joint, edge plates, 8ths, 10ths and 16ths of inches, $\frac{3}{4}$ inch wide, - - - - -	8 00
62½.	Square joint, bound, 8ths, 10ths, 12ths and 16ths of inches, $\frac{3}{4}$ inch wide, - - - - -	15 00

TWO FEET, FOUR FOLD, BROAD.

67.	Round joint, middle plates, 8ths and 16ths of inches, $1\frac{3}{8}$ inches wide, - - - - -	5 50
70.	Square joint, middle plates, 8ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	7 00
72.	Square joint, edge plates, 8ths, 10ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	9 00
72½.	Square joint, bound, 8ths, 10ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	18 00
73.	Arch joint, middle plates, 8ths, 10ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	9 00
75.	Arch joint, edge plates, 8ths, 10ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	11 00
76.	Arch joint, bound, 8ths, 10ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	20 00
77.	Double arch joint, bitted, 8ths, 10ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	12 00
78.	Double arch joint, half bound, 8ths, 10ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	20 00
78½.	Double arch joint, bound, 8ths, 10ths and 16ths of inches, drafting scales, $1\frac{3}{8}$ inches wide, - - - - -	24 00
83.	Arch joint, edge plates, slide 8ths, 12ths and 16ths of inches, 100ths of a foot, octagonal scales, $1\frac{3}{8}$ inches wide, - - - - -	14 00

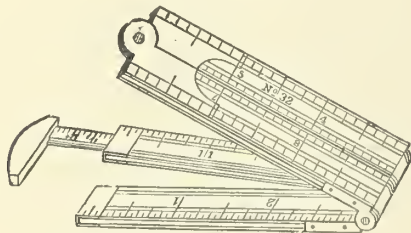
FIG. 1051.



BOXWOOD CALIPER RULES, SIX INCH.

No.	Description	Per Doz.
36.	Square joint, two fold, 8ths, 10ths, 12ths and 16ths of inches, $\frac{7}{8}$ inch wide, - - - - -	\$7 00
13.	Square joint, two fold, 8ths and 16ths of inches, $1\frac{1}{2}$ inches wide, - - - - -	10 00
13½.	Square joint, two fold, 8ths and 16ths of inches, $1\frac{1}{2}$ inches wide, - - - - -	12 00

FIG. 1052.



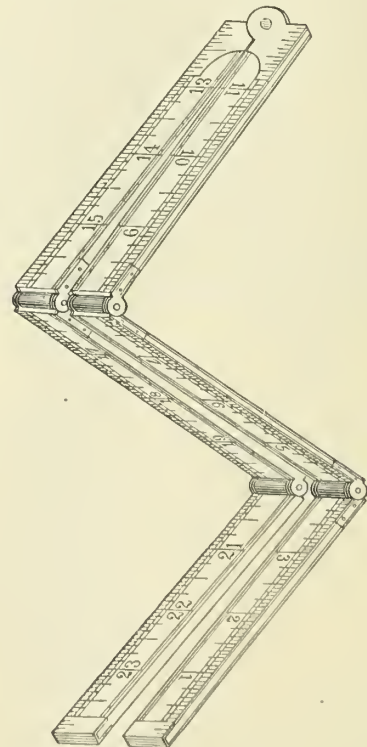
CALIPER, ONE FOOT, FOUR FOLD.

No.	Description	Per Doz.
32.	Arch joint, edge plates, 8ths, 10ths, 12ths and 16ths of inches, 1 inch wide, - - - - -	\$12 00
32½.	Arch joint, bound, 8ths, 10ths, 12ths and 16ths of inches, 1 inch wide, - - - - -	20 00

CALIPER, ONE FOOT, TWO FOLD.

36½.	Square joint, two fold, 12 inch, 8ths, 10ths, 12ths and 16ths of inches, $1\frac{3}{8}$ inches wide, - - - - -	12 00
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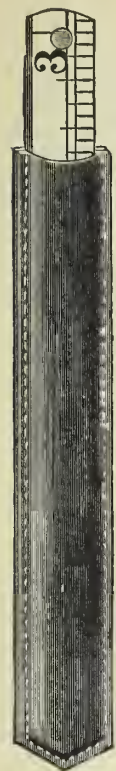
FIG. 1053.



TWO FEET, SIX FOLD, RULES.

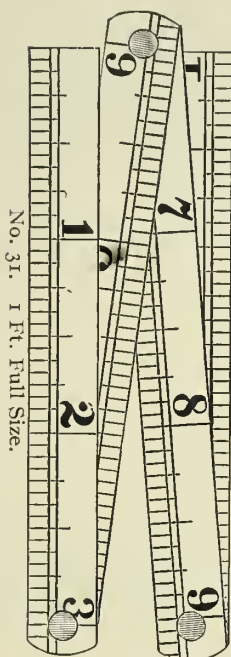
No.	Description	Per Doz.
58.	Arch joint, edge plates, 8ths, 10ths, 12ths and 16ths of inches, $\frac{3}{4}$ inch wide, - - - - -	\$13 00
58½.	Arch joint, bound, 8ths, 10ths, 12ths and 16ths of inches, $\frac{3}{4}$ inch wide, - - - - -	36 00

FIG. 1054.



Rule in Leather Case.

FIG. 1055.



FOLDING STEEL POCKET RULES.

FOLDING STEEL RULES.

No.		Rules only per doz.	Rules with cases per doz	Nickel Plated extra. per doz.
40.	1 ft., Folding Pocket, $\frac{3}{8}$ in. x 28 gauge, 3 in. joints, 4 fold,	- \$4.00	\$5.50	\$1.50
40.	2 ft., Folding Pocket, $\frac{3}{8}$ in. x 28 gauge, 3 in. joints, 8 fold,	- 8.00	10.00	2.50
41.	1 ft., Folding Pocket, $\frac{3}{8}$ in. x 28 gauge, 4 in. joints, 3 fold,	- 4.00	5.50	1.50
41.	2 ft., Folding Pocket, $\frac{3}{8}$ in. x 28 gauge, 4 in. joints, 6 fold,	- 7.50	9.50	2.50
41.	3 ft., Folding Pocket, $\frac{3}{8}$ in. x 28 gauge, 4 in. joints, 9 fold,	- 11.00	13.50	3.50
41.	4 ft., Folding Pocket, $\frac{5}{8}$ in. x 28 gauge, 4 in. joints, 12 fold,	- 14.50	17.00	4.50
46.	2 ft., Folding Pocket, $\frac{3}{8}$ in. x 26 gauge, 6 in. joints, 4 fold,	- 7.50	10.00	2.50
46.	3 ft., Folding Pocket, $\frac{3}{8}$ in. x 26 gauge, 6 in. joints, 6 fold,	- 11.00	14.00	3.50
46.	4 ft., Folding Pocket, $\frac{3}{8}$ in. x 26 gauge, 6 in. joints, 8 fold,	- 14.50	17.50	4.50

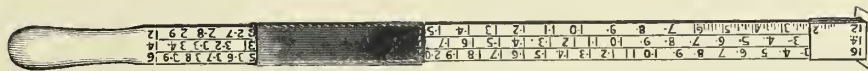
All the above graduated 16ths of inches both sides.

SURVEYORS' FOLDING STEEL POCKET RULES.

Marked in inches and 16ths one side, feet, 10ths and 100ths feet other side.

No.		In Leather cases, per dozen.	Nickel Plated extra per dozen.
42.	1 ft., $\frac{3}{8}$ in. x 28 gauge, 4 in. joints, 3 fold, - - -	\$ 7.00	\$1.50
42.	2 ft., $\frac{3}{8}$ in. x 28 gauge, 4 in. joints, 6 fold, - - -	12.00	2.50
42.	3 ft., $\frac{3}{8}$ in. x 28 gauge, 4 in. joints, 9 fold, - - -	17.00	3.50
47.	2 ft., $\frac{3}{8}$ in. x 26 gauge, 6 in. joints, 4 fold, - - -	12.00	2.50
47.	3 ft., $\frac{3}{8}$ in. x 26 gauge, 6 in. joints, 6 fold, - - -	17.00	3.50

FIG. 1056.



SPRING STEEL BOARD RULES.

Nickel Plated and Lacquered.

No.		Per doz.
51.	3½ ft., 3 tier, Inspector's rule, - - - - -	\$22.00
52.	3 ft., 3 tier, Board rule, - - - - -	26.00
52.	2½ ft., 3 tier, Sorting rule, - - - - -	33.00
58.	3 ft., 4 tier, Board rule, - - - - -	39.00
58½.	2½ ft., 4 tier, Sorting rule, - - - - -	36.00
59.	3 ft., 5 tier, Board rule, - - - - -	42.00

FIG. 1057.



FOLDING STEEL RULES.

No. 85. Full Width.

No.		Rules only per doz.	Rules with Leather cases per doz.	Nickel Plated extra per doz.
70.	2 ft. Folding Pocket, $\frac{3}{4}$ in. x 21 gauge, 6 in. joints, 4 fold, - 8ths of inches on one side, 16ths on other.	\$14.00	\$18.00	\$3.00
77.	2 ft. Folding Pocket, $\frac{3}{4}$ in. x 21 gauge, 8 in. joints, 3 fold, Board measure, 8 ft. to 22 ft. lengths.	17.00	21.00	3.00
80.	2 ft. Folding, $\frac{3}{4}$ in. x 21 gauge, 12 in. joints, 2 fold, - 16ths of inches on one side, 8ths on other.	10.00		3.00
85.	2 ft. Folding, $\frac{3}{4}$ in. x 21 gauge, One Stop Joint, - German Silver Ends, 8ths inches one side, 16ths on other.	12.00		3.00
86.	2 ft. Folding, $\frac{3}{4}$ in. x 21 gauge, One Stop Joint, - German Silver Ends, 16ths of inches one side, circumference inches on other.	17.00		3.00

LOG AND BOARD RULES.

ACME INSPECTOR'S RULE.

- No. 1. Acme, 3½ feet 3 tier, extra heavy brazed head. Per dozen, - - - - - \$30.00
- No. 2. Acme, 3 feet, 3 tier, extra heavy brazed head. Per dozen. - - - - - 28.00

FIG. 1058.

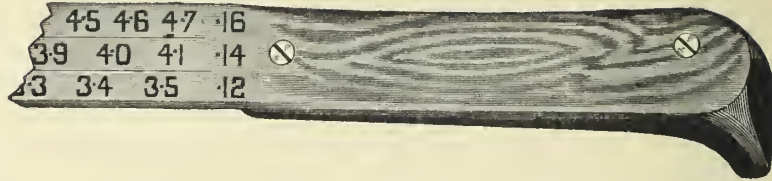
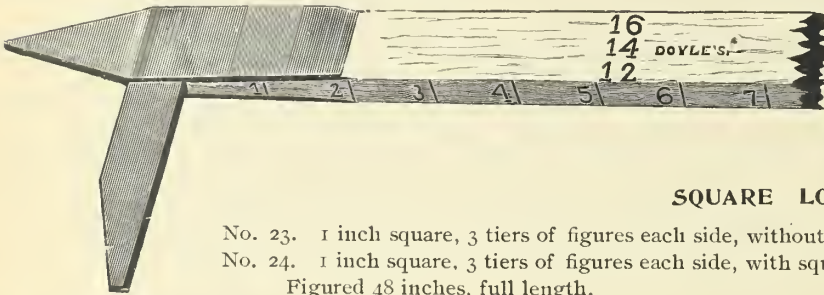


FIG. 1059.



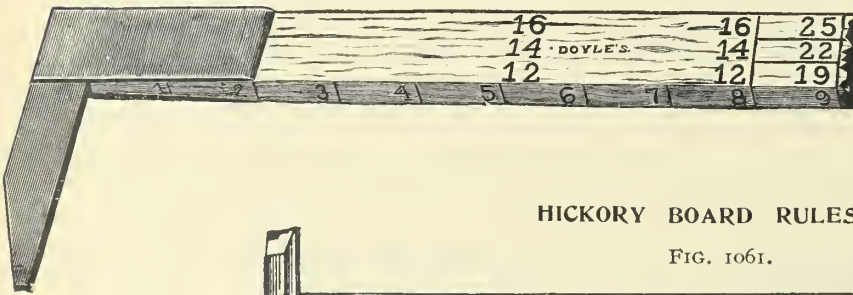
PICK AND HOOK HEAD LOG RULE.

- No. 21. Pick and Hook Head Log Rule. Per dozen, - - - - - \$29.00
- Figured 48 inches with 8 inch handle ; full length 4 feet 8 inches.

SQUARE LOG RULES.

- No. 23. 1 inch square, 3 tiers of figures each side, without head. Per dozen, - - - - - \$24.00
- No. 24. 1 inch square, 3 tiers of figures each side, with square head. Per dozen, - - - - - 30.00
- Figured 48 inches, full length.

FIG. 1060.

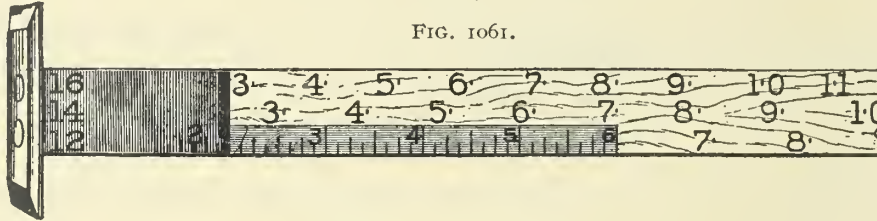


LOG RULES.

- No. 16½. Flat Steel Hook Log Rule. Per dozen, - - - - - \$28.00
- Figured 48 inches with 8 inch handle ; full length 4 feet 8 inches.

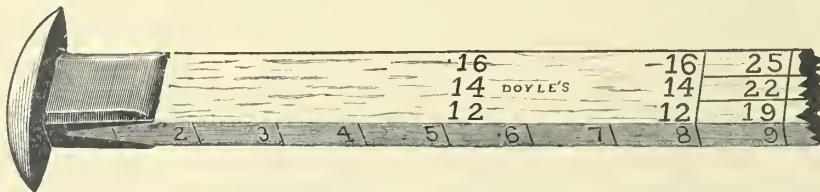
HICKORY BOARD RULES.

FIG. 1061.



HICKORY LOG RULES.

FIG. 1062.



No. 4 BOARD RULE.

- No. 4. 3 tier, 3 foot Board Rule, patent socket steel head. Per dozen, - - - - - \$21.00
- A good, low-priced serviceable rule.
- No. 4½. 3 tier, 2½ foot Sorting Rule, patent socket steel head. Per dozen, - - - - - 20.00
- No. 5. 3 tier, 3 foot Board Rule, brass plates, patent socket steel head. Per dozen, - - - - - 25.00
- This rule is the same as No. 4, except that it has brass inch plates.
- No. 20. Plain Log Rule, no head, figured 48 inches, with 8 inch handle, Per dozen, - - - - - 21.00
- Full length, 4 feet 8 inches.
- No. 14. Square Head Log Rule, figured 48 inches, with 8 inch handle. Per dozen, - - - - - 27.00
- Full length, 4 feet 8 inches.
- No. 15. Square Head Log Rule, figured 36 inches, with 6 inch handle. Per dozen, - - - - - 23.00
- Full length, 3½ feet.
- No. 22. T Head Log Rule, Wisconsin pattern, figured 48 inches. Per dozen, - - - - - 27.00
- With 8 inch handle. Full length, 4 feet 8 inches.

LUMBERMAN'S TOOLS. IMPROVED MARKING STICK.

ADAPTED TO LUMBER CRAYONS OF STANDARD MAKES.

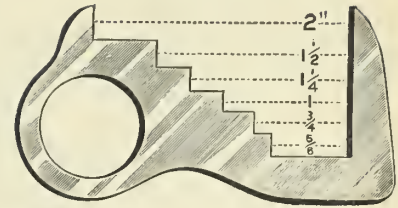
FIG. 1063.



Inspectors' Stick, 36 inches long, with hickory handle, - - - per dozen, \$12 00
Pencil Holder only, without handle, - - - " " 10 00

LUMBER GAUGE.

FIG. 1064.



Measures, $\frac{5}{8}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, and 2 in.
Price, - - per doz., \$6 00

BEADED BOOT CALKS.

FORGED FROM BEST CRUCIBLE STEEL. BLUED OR BRIGHT.

FIG. 1066.

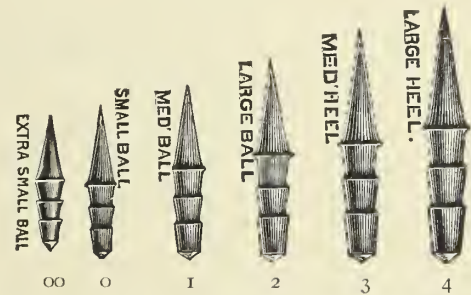
CALK SETS AND SET AND PUNCH COMBINED.

FOR SETTING ALL SIZES OF CALKS.

FIG. 1065.



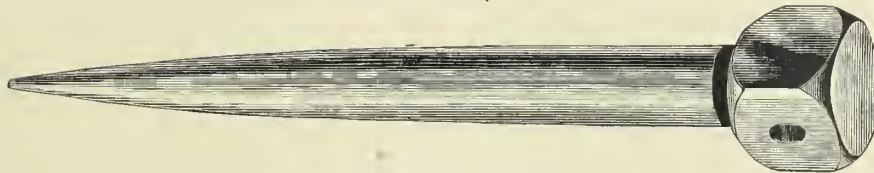
SET.



Nos. 00, 0, 1 and 2 packed 100 in box, 1000 in package. Nos. 3 and 4 packed 50 in box, 500 in package.

Samples and prices on application.

FIG. 1067.



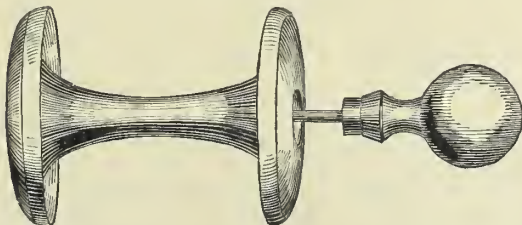
COMBINED SET AND PUNCH.

Sets, - - - per dozen, \$
Combined Set and Punch, - - - " " "

FIG. 1069.

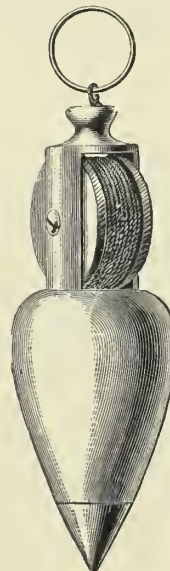
CHALK-LINE REELS, ETC.

FIG. 1068.



No.		Per Doz.
12.	Chalk-line reels, 3 dozen in a box, - - -	\$0 36
13.	Chalk-line reels, with 60 feet best quality chalk-line, 1 dozen in a box, - - -	1 75
14.	Chalk-line reels, with steel scratch awls, 1 dozen in a box, - - -	95
15.	Chalk-line reels, with steel scratch awls, and 60 feet best quality chalk-line, 1 dozen in a box, - -	2 25

ADJUSTABLE PLUMB BOBS.

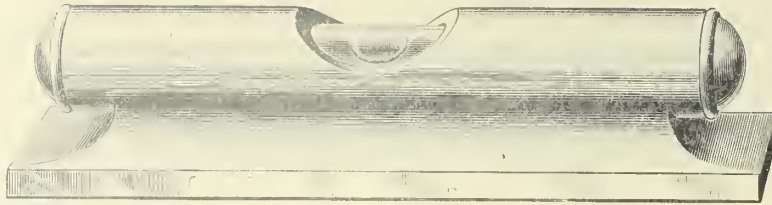


No.	Each.
1. (Small) Bronze metal, with steel point, \$1 50	
2. (Large) Bronze metal, with steel point, 1 75	
5. (Large) Iron, with steel point, - - 1 00	

LEVELS AND PLUMBS.

IRON BENCH LEVELS.

FIG. 1070.



FULL SIZE ILLUSTRATION OF NO. 110.

No. 10. Japanned, 4 inches long, - - per dozen, \$5 00 No. 110. Nickel plated, 4 inches long, - per dozen, \$8 00

FIG. 1071.



FULL SIZE ILLUSTRATION OF NO. 111.

For Square or Straight Edge.

No. 11. Japanned, 4 inches long, - - per dozen, \$6 50 No. 111. Nickel plated, 4 inches long, - per dozen, \$9 50

HEXAGON LEVELS.

FIG. 1072.



FULL SIZE ILLUSTRATION OF NO. 3.

No. 2½	is	3-8 inch x 2½ inches,	-	-	-	per dozen, \$3 00
" 3	is	3-8 inch x 3 inches,	-	-	-	" " 3 60
" 3½	is	3-8 inch x 3½ inches,	-	-	-	" " 4 20
" 4	is	7-16 inch x 4 inches,	-	-	-	" " 5 50
" 5	is	7-16 inch x 5 inches,	-	-	-	" " 6 00

IMPROVED IRON LEVEL, DOUBLE PLUMB.

FIG. 1073.



No. 12 is 2 inches wide x 12 inches long, - per dozen, \$18 00 No. 24 is 2 inches wide x 24 inches long, - per dozen, \$24 00
 " 18 is 2 inches wide x 18 inches long, - " " 21 00

ECLIPSE LEVELS.

FIG. 1074.

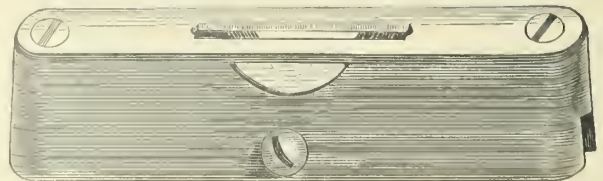


No. 34.

Eclipse Level, Nickel Plated, 6 inch, with Ground Glasses, - \$1 50
 The outer shell of the level can be turned, so as to completely protect the glass from damage when not in use.

POCKET LEVEL.

FIG. 1075.



No. 46.

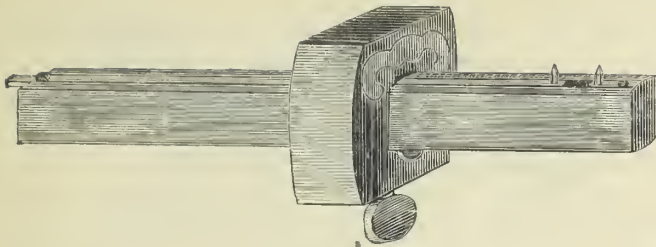
Iron, Brass Top Plate - - per dozen, \$3 50

MACHINISTS' IRON LEVELS.

No. 38. Iron Level, Brass Top Plate, 4 inch - per dozen, \$3 50 No. 39. Iron Level, Brass Top Plate, 6 inch - per dozen, \$4 50

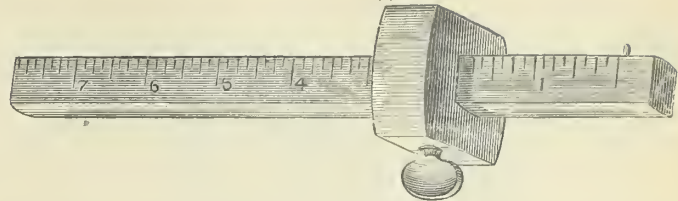
GAUGES AND SPOKESHAVES.

FIG. 1076.



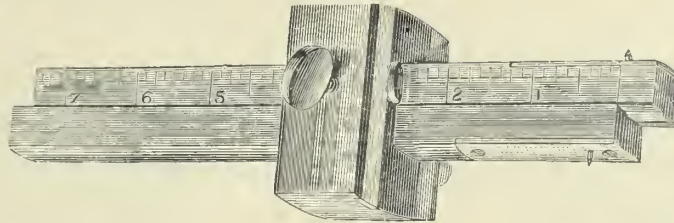
No. 73

FIG. 1077.



No. 61.

FIG. 1078.



No. 71.

GAUGES.

No.		Per Doz
0.	Marking gauge, beechwood, boxwood thumb screw, marked, steel point, 1 dozen in a box,	\$0.75
61.	Marking gauge, beechwood, boxwood thumb screw, oval bar, marked, steel point, 1 dozen in a box,	1.00
61 1/2.	Marking gauge, beechwood, boxwood thumb screw, oval head and bar marked, steel point, 1 dozen in a box,	1.25
73.	Patent mortise gauge, boxwood, polished, plated head, brass slide, brass thumb screw and shoe, oval bar, marked, steel points, 1/2 dozen in a box,	8.00
76.	Patent mortise gauge, boxwood, polished, plated head, screw slide, brass thumb screw and shoe, oval bar, marked, steel points, 1/2 dozen in a box,	11.00
80.	Patent mortise gauge, boxwood, full plated head, plated bar, screw slide, brass thumb screw and shoe, marked, steel points, 1/2 dozen in a box,	18.00
67.	Mortise gauge, adjustable wood slide, boxwood thumb screw, oval bar, marked, steel points, 1/2 dozen in a box,	4.00
68.	Mortise gauge, plated head, adjustable wood slide, brass thumb screw and shoe, oval bar, marked, steel points, 1/2 dozen in box,	6.00
71.	Patent double gauge (marking and mortise gauge combined), beechwood, polished, plated head and bars, brass thumb screws and shoes, oval bars, marked, steel points, 1/2 dozen in a box,	8.00
72.	Patent double gauge (marking and mortise gauge combined), beechwood, polished, boxwood thumb screws, oval bars, marked, steel points, 1/2 dozen in a box,	4.00
74.	Patent double gauge (marking and mortise gauge combined), boxwood, polished, full plated head and bars, brass thumb screws and shoes, oval bars, marked, steel points, 1/2 dozen in a box,	14.00
70.	Cutting gauge, mahogany, polished, plated head, boxwood thumb screw, oval bar, marked, steel cutter, 1 dozen in a box,	4.00

BAILEY'S IRON SPOKE SHAVE.

The Spokeshaves in the following list are superior in style, quality and finish to any in market. The cutters are made of the best English cast steel, tempered and ground by an improved method, and are in perfect working order when sent from the factory.

FIG. 1079.



No. 51.	Double iron, raised handle, 10 inch, 2 1/2 inch cutter, per dozen,	\$3.50
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FIG. 1080.



No. 55.	Model double iron, hollow face, 10 inch, 2 1/2 inch cutter, per dozen,	\$3.00
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FIG. 1081.



No. 60.	Double cutter, hollow and straight, 10 inch, 1 1/2 inch cutter, per dozen,	\$4.50
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FIG. 1082.

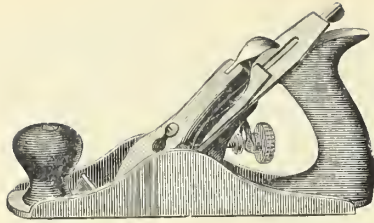


PATENT REVERSIBLE SPOKESHAVE.

No. 62.	Raised handle (heavy), double cutter, 10 inch, 2 1/2 inch cutters,	\$6.00
	Cast steel cutters,	1.00

PLANES.

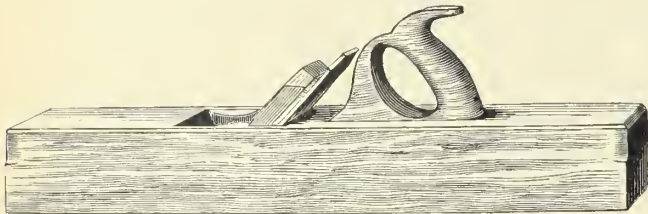
FIG. 1083.



IRON PLANES.

No. 1.	Smooth,	5½ inches in length,	1¼ inch cutter,	each,	\$2 25
" 2.	Smooth,	7 inches in length,	1⅝ inch cutter,	each,	2 75
" 3.	Smooth,	8 inches in length,	1¾ inch cutter,	each,	3 00
" 4.	Smooth,	9 inches in length,	2 inch cutter,	each,	3 25
" 4½.	Smooth,	10 inches in length,	2⅜ inch cutter,	each,	3 75
" 5.	Jack,	14 inches in length,	2 inch cutter,	each,	3 75
" 6.	Fore,	18 inches in length,	2⅜ inch cutter,	each,	4 75
" 7.	Jointer,	22 inches in length,	2⅜ inch cutter,	each,	5 50
" 8.	Jointer,	24 inches in length,	2⅝ inch cutter,	each,	6 50

FIG. 1084.



WOOD BENCH PLANES.

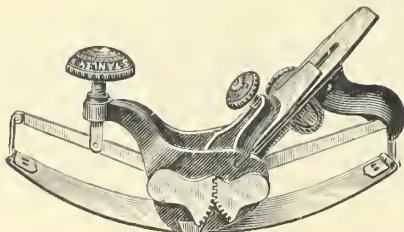
SINGLE IRONS.

No. 10.	Smooth,	-	-	-	-	Each,	\$0 60
" 11.	Jack,	-	-	-	-	Each,	75
" 12.	Fore,	-	-	-	-	Each,	1 00
" 13.	Jointer,	26 inch,	-	-	-	Each,	1 10

DOUBLE IRONS.

No. 14.	Smooth,	-	-	-	-	Each,	\$0 90
" 15.	Jack,	-	-	-	-	Each,	1 00
" 16.	Fore,	-	-	-	-	Each,	1 40
" 17.	Jointer,	26 inch,	-	-	-	Each,	1 50
" 18.	Jointer,	28 inch,	-	-	-	Each,	1 60

FIG. 1085.

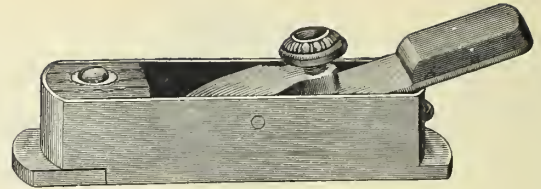


STANLEY ADJUSTABLE CIRCULAR PLANE.

Adjustable Circular Plane, 1¼ inch cutter, - Each, \$4 00

This plane has a flexible steel face, which can be easily shaped to any required arc, either concave or convex, by turning the knob on the front of the plane.

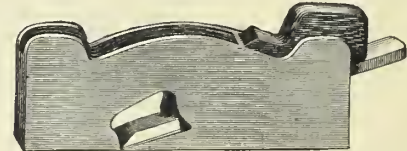
FIG. 1086.



IRON BLOCK PLANES.

No. 7.	7¼ inches long,	1½ inch cutter,	-	Each,	\$4 25
" 8.	7¼ inches long,	1¾ inch cutter,	-	Each,	4 85

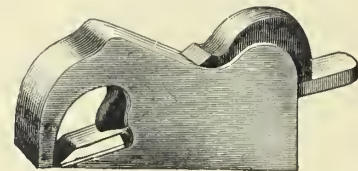
FIG. 1087.



IRON SHOULDER RABBIT PLANES.

No. 1.	¾ inch wide,	5½ inches long,	cast iron,	each,	- \$2 50
" 2.	1 inch wide,	6½ inches long,	cast iron,	each,	- 3 00
" 3.	1¼ inch wide,	7½ inches long,	cast iron,	each,	- 3 75
" 4.	1½ inch wide,	8½ inches long,	cast iron,	each,	- 5 00
" 5.	¾ inch wide,	5½ inches long,	bell metal,	each,	- 3 25
" 6.	1 inch wide,	6½ inches long,	bell metal,	each,	- 4 00

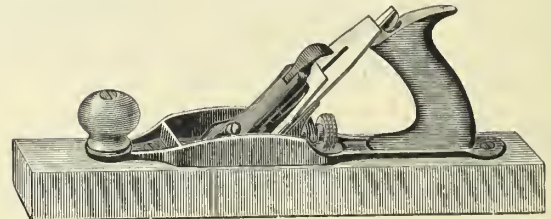
FIG. 1088.



ENGLISH BULL NOSE PLANES.

No. 9.	4 inches long	1 inch cutter,	cast iron,	each,	- \$2 50
" 10.	4 inches long,	1 inch cutter,	bell metal,	each,	- 3 25

FIG. 1089.

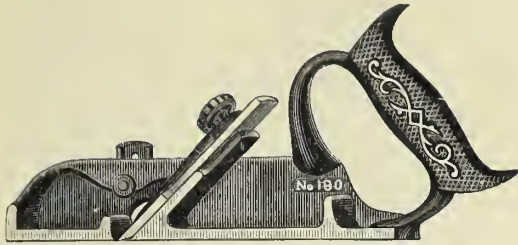


BAILEY'S ADJUSTABLE WOOD PLANES.

No.	Plane	Length	Cutter	Each.
21.	Smooth Plane,	7 inches	1¾ inch	\$2 00
22.	Smooth Plane,	8 inches	1¾ inch	2 00
23.	Smooth Plane,	9 inches	1¾ inch	2 00
24.	Smooth Plane,	8 inches	2 inch	2 00
25.	Block Plane,	9½ inches	1¾ inch	2 00
26.	Jack Plane,	15 inches	2 inch	2 25
27.	Jack Plane,	15 inches	2½ inch	2 50
28.	Fore Plane,	18 inches	2⅜ inch	2 75
29.	Fore Plane,	20 inches	2⅜ inch	2 75
30.	Jointer Plane,	22 inches	2⅜ inch	3 00
31.	Jointer Plane,	24 inches	2⅜ inch	3 00
32.	Jointer Plane,	26 inches	2⅜ inch	3 25
33.	Jointer Plane,	28 inches	2⅜ inch	3 25
34.	Jointer Plane,	30 inches	2⅜ inch	3 50

PLANES.

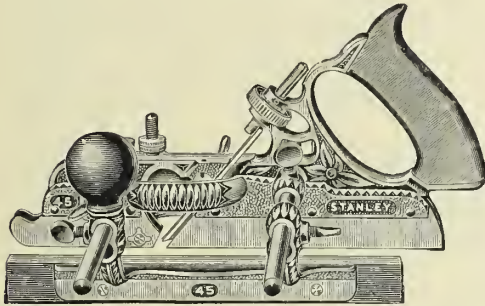
FIG. 1090.



PATENT IMPROVED RABBET PLANE.

No.	Iron Stock, 8 inches in length, 1½ in. wide	-	Each.
180.	Iron Stock, 8 inches in length, 1¼ in. wide	-	\$1.00
181.	Iron Stock, 8 inches in length, 1 in. wide	-	1.00
182.	Iron Stock, 8 inches in length, 1½ in. wide, with spur,	-	1.15
190.	Iron Stock, 8 inches in length, 1¼ in. wide, with spur,	-	1.15
191.	Iron Stock, 8 inches in length, 1 in. wide, with spur,	-	1.15
192.	Iron Stock, 8 inches in length, 1 in. wide, with spur,	-	1.15

FIG. 1091.



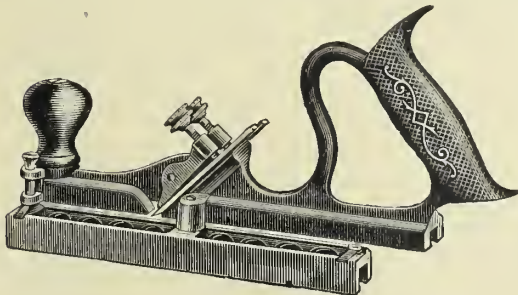
PATENT ADJUSTABLE BEADING, RABBET AND SLITTING PLANE.

Each plane is accompanied by seven beading tools ($\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$ inch), nine plow and dado bits ($\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$ inch), a slitting tool and a tonguing tool.

Price, including beading tools, bits, slitting tool, etc.

Iron stock and fence, - - - - - \$8.00

FIG. 1092.

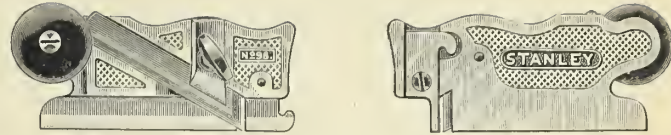


TONGUING AND GROOVING PLANE.

Prices, including tonguing and grooving tools.

No.	Iron stock and fence, for ¾ to 1¼ inch boards,	-	Each.
48.	Iron stock and fence, for ¾ to 1¼ inch boards,	-	\$2.50
49.	Iron stock and fence, for ¾ to ¾ inch boards,	-	2.50

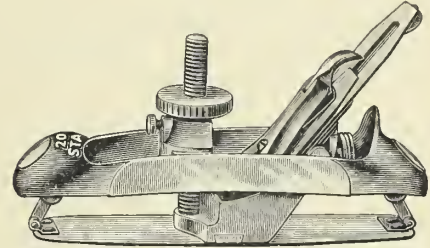
FIG. 1093.



SIDE RABBET PLANE.

No. 38. Side Rabbet Plane, 4 inches in length, - - - \$0.90

FIG. 1094.

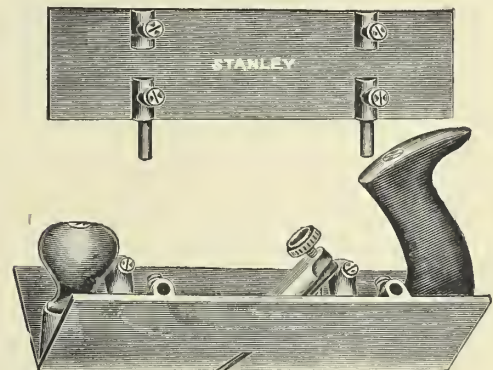


IMPROVED VICTOR CIRCULAR PLANE.

The flexible face of the plane can be made concave, or convex, by turning the screw which is attached to its centre.

No. 20. Adjustable circular plane, nicked, 1¼ inch cutter, \$6.00

FIG. 1095.



CORE-BOX PLANE.

No. 57. Core-Box Plane, for semicircles, up to 2½ inches diameter, - - - - - \$3.00

This plane is constructed so that the sides can be extended by additional sections, 2½ inches wide, until a diameter of 10 inches can be worked if desired.

The price for these additional sections - per pair, \$1.00

BAILEY'S PLANE IRONS.

Packed, one half dozen in a box.

	1¼	1½	1¾	2	2½	2¾	2½
Inches.							Each.
Single Irons, -	20	25	28	30	33	37	40 cents
Double Irons, -	40	45	50	55	60	65	70 cents

Orders for Plane Irons should designate the No of the Planes for which they are wanted.

PLANE IRONS, AND STEEL GOUGES, FIRMERS, &c.

No. 25. CAST STEEL CUT PLANE IRONS.

Made from finest tool steel. Sharpened ready for use.

1½	1⅝	1¾	1⅞	2	2⅛	2¼ inches.
\$3.25	3.25	3.25	3.50	3.75	4.00	4.50 per dozen
2⅜	2½	2⅝		2¾	2⅞	3 inches.
\$5.00	5.25	6.00		6.50	7.00	8.25 per dozen

No. 26. CAST STEEL DOUBLE PLANE IRONS.

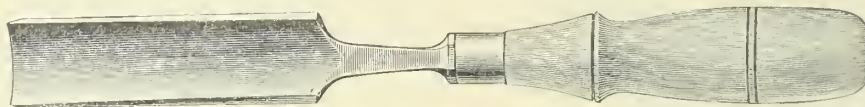
Sharpened ready for use. Tempered with special care.

1½	1⅝	1¾	1⅞	2	2⅛	2¼ inches.
\$6.00	6.00	6.25	6.75	7.00	7.25	8.00 per dozen
2⅜	2½	2⅝		2¾	2⅞	3 inches.
\$8.75	9.25	10.00		10.75	12.00	13.75 per dozen

No. 130. HANDLED TANGED FIRMER GOUGES.

Outside bevel. Sharpened ready for use. The blades are made from selected tool steel; with selected handles and extra heavy brass ferrules. Blades from 5½ to 6 inches long.

FIG. 1098.

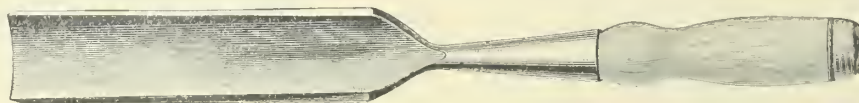


⅛	⅜	¼	⅝	⅜	½	⅝	¾ inch.
\$3.25	3.25	3.25	3.50	3.75	3.75	4.25	4.50 per dozen
⅞	1	1⅛		1¼	1½	1¾	2 inches.
\$5.00	5.25	6.50		6.75	8.00	9.50	11.25 per dozen

No. 91. SOCKET FIRMER.

Solid cast steel, with patent leather tipped handles. Outside bevel. Regular sweep. 6 inch blades. Sharpened and tested ready for use.

FIG. 1099.



⅛	⅜	¼	⅝	⅜	½	⅝	¾ inch.
\$6.00	6.50	6.75	7.00	7.00	8.00	9.00	9.50 per dozen
⅞	1	1⅛		1¼	1½	1¾	2 inches.
\$10.00	10.50	11.00		11.50	12.50	13.00	14.00 per dozen

No. 22. SOCKET FIRMER.

Solid cast steel. Outside bevel. 6 inch blade.

FIG. 1100.



⅛	¼	⅜	½	⅝	¾	⅞ inch.
\$5.00	5.75	6.00	7.00	8.00	8.50	9.00 per dozen
1	1¼	1½	1¾	2	2½	3 inches.
\$9.50	10.50	11.50	12.00	13.00	20.00	26.00 per dozen

FIG. 1096.

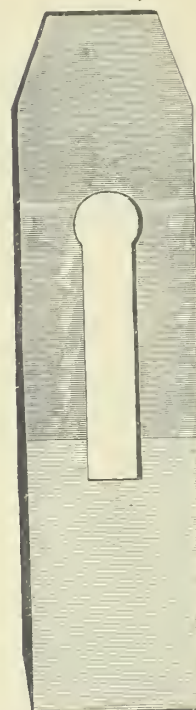


FIG. 1097.

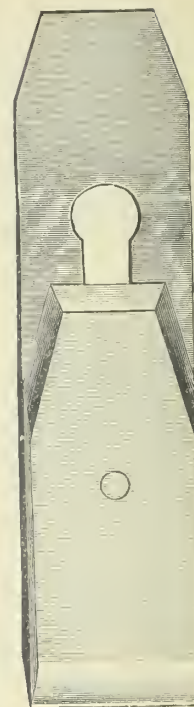


FIG. 1101.



No. 67.

FIG. 1102.



No. 67.

STEEL CHISELS.**EXTRA QUALITY SOCKET FIRMER CHISELS. No. 67.**

BLADES 6 TO 6½ INCHES LONG. SIZES.

1-8 \$5.37	3-16 5.37	1-4 5.37	5-16 5.37	3-8 5.37	1-2 6.00	5-8 6.75	3 4 inch. 7.38 per dozen.
7-8 \$7.38	1 8.00	1 1/8 8.75	1 1/4 8.75	1 1/2 9.38	1 3/4 10.00	2 10.75	2 inch. per dozen.

BEVELED EDGE SOCKET FIRMER. No. 11.

APPLE WOOD HANDLES.

FIG. 1103.



6 INCH BLADE. SOLID CAST STEEL. SHARPENED READY FOR USE.

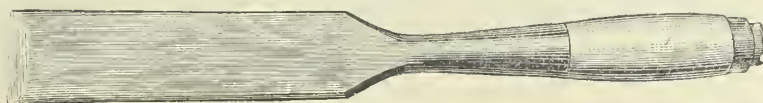
1-8 \$8.00	1-4 8.00	3-8 8.00	1-2 9.00	5-8 10.00	3-4 11.00	7-8 11.00	1 12.00	1 1/4 13.00	1 1/2 14.00	1 3/4 15.00	2 inch. 16.00 per dozen.
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ASSORTED IN SETS.

1/8 to 2 inch (12 in a set)	One set in a box.	-	-	-	-	-	-	\$11.25
1/8 to 1 1/2 inch (9 in a set)		-	-	-	-	-	-	7.75
1/4 to 2 inch (8 in a set)		-	-	-	-	-	-	8.25
1/2 to 2 inch (6 in a set)		-	-	-	-	-	-	6.25

SOCKET FRAMING, EXTRA QUALITY. No. 33.

FIG. 1104.



BEST CAST STEEL. 8 INCH BLADE, WITH HICKORY HANDLES.

1-4 \$12.00	5-26 12.00	3-8 12.00	7-16 12.00	1-2 12.00	5-8 13.00	3-4 14.00	7-8 15.00	1 inch. 16.00 per dozen.
1 1/8 \$18.00	1 1/4 18.00	1 1/2 20.00	1 3/4 22.00	2 24.00	2 1/4 28.00	2 1/2 32.00	2 3/4 36.00	3 inch. 40.00 per dozen.

LONG THIN SOCKET PARING CHISELS. No. 80.

FIG. 1105.



PACKED WITH PATENT LEATHER TIPPED HANDLES.

BLADES 8 INCHES LONG. SHARPENED READY FOR USE. SIZES.

1-8 \$7.00	1-4 8.25	3-8 8.50	1-2 9.50	5-8 10.00	3-4 10.50	7-8 inch. 11.00 per dozen.
	1 \$11.50	1 1/4 12.50	1 1/2 13.50	1 3/4 14.00	2 inch. 15.00 per dozen.	

CORNER CHISELS. No. 17.

3-4 \$28.00	7-8 30.00	1 32.00	1 1/8 34.00	1 1/4 36.00	1 1/2 inch. 40.00 per dozen.
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Half dozen in a wooden box.

DOWEL BITS.

FIG. 1106.



SOLID CAST STEEL.

4	5	6	7	8	9	10 16ths inch
\$3.00	3.40	3.80	4.40	4.80	5.20	5.60 per dozen

Long or short Dowel Bits furnished to order. The long measure about 4½ inches and the short about 3 inches.
Price the same.

FIG. 1107.



3	4	5	6	7	8	9	10	11	12-16ths inch
\$4.00	3.50	3.50	3.75	3.75	4.00	4.25	4.50	5.00	5.50 per dozen
13	14	15	16	17	18	20	22		24-16ths inch
\$6.00	6.50	7.25	8.00	9.00	10.00	11.00	12.00		14.00 per dozen

FIG. 1108.

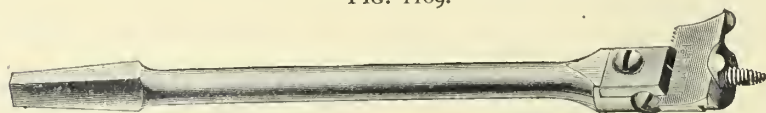


SOLID CAST STEEL.

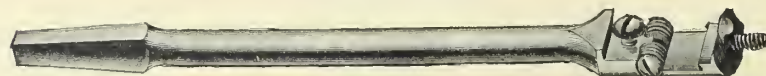
4	5	6	7	8-16ths inch
\$3.40	3.40	3.80	4.40	4.80 per dozen

Machine bits with twist longer than 6 inches will be charged at special prices.

FIG. 1109.



CUTTER IN PLACE.



BIT WITH CUTTERS OFF. MADE IN TWO SIZES.

No.	I.		With two cutters, cutting from	$\frac{7}{8}$	to 3 inches,	-	-	-	-	.	.	-	per dozen,	\$26.00
"	2.	"	"	$\frac{5}{8}$	to $1\frac{3}{4}$ inches,	-	-	-	-	-	.	.	"	18.00

EXTRA CUTTERS.

[illegible]

EXTRA CAPS.

EXTRA SCREWS.

Small,	-	-	-	-	-	each,	12c.	Small,	-	-	-	-	-	per dozen,	60c.
Large,	-	-	-	-	-	"	15c.	Large,	-	-	-	-	-	"	70c.

AUGERS.

IMPROVED LIP AND SPUR AUGERS, No. 30.

FIG. 1110.



12 INCH TWIST.

4	5	6	7	8	9	10	11-16ths inch
\$6.50	6.50	7.50	9.00	10.25	11.25	12.75	13.25 per dozen
12	13	14	15	16	17		18-16ths inch
\$15.50	16.50	17.75	18.75	20.50	24.00		27.00 per dozen

LONG-EYE BRIGHT AUGERS, No. 42.

FIG. 1111.



$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$ inch
\$6.50	6.50	7.50	9.00	9.50	10.50	11.50	12.50 per dozen
$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4 inches
\$15.00	19.00	22.00	27.50	33.00	45.00	55.00	75.00 per dozen

SHORT-EYE BRIGHT AUGERS, No. 43.

FIG. 1112.



$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$ inch
\$5.00	5.00	6.00	7.50	8.00	8.50	10.00	10.50 per dozen
$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$			2 inches
\$12.00	12.50	15.00	15.00	18.00			18.00 per dozen.

CARPENTERS' NUT AUGERS.

SQUARE LIPPED PATTERN, No. 30.

$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2 inches
\$5.50	6.50	8.00	8.50	9.50	10.50	11.50	14.00	17.00	20.00 per dozen
$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$			4 inches
\$24.00	30.00	35.00	40.00	45.00	50.00	60.00			70.00 per dozen

CIRCLE LIPPED PATTERN, No. 33.

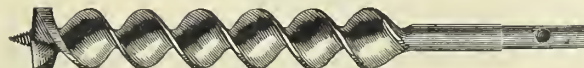
FIG. 1113.



$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2 inches
\$6.00	7.50	9.00	10.50	12.00	13.50	15.00	18.00	19.50	21.00	22.50	24.00 per dozen

BORING MACHINE AUGERS, No. 30.

FIG. 1114.



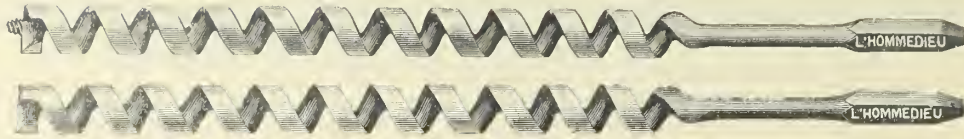
SQUARE LIPPED PATTERN.

$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2 inches
\$10.00	10.00	10.00	10.00	12.00	13.00	14.00	16.00	18.00	22.00 per dozen

SHIP AUGERS.

L'HOMMEDIEU SHIP AUGERS.

FIG. 1115.



WITH OR WITHOUT SCREWS.

Sizes 1/2 inch and under	per dozen, \$	Sizes 33 and 34-16 inch	per dozen, \$
" 9 and 10-16 inch	7 50	" 35 " 36-16 "	48 00
" 11 " 12-16 "	9 00	" 37 " 38-16 "	60 00
" 13 " 14-16 "	10 50	" 39 " 40-16 "	72 00
" 15 " 16-16 "	12 00	" 41 " 42-16 "	84 00
" 17 " 18-16 "	13 50	" 43 " 44-16 "	96 00
" 19 " 20-16 "	15 00	" 45 " 46-16 "	108 00
" 21 " 22-16 "	16 50	" 47 " 48-16 "	120 00
" 23 " 24-16 "	18 00	" 51 " 52-16 "	132 00
" 25 " 26-16 "	21 00	" 55 " 56-16 "	156 00
" 27 " 28-16 "	24 00	" 59 " 60-16 "	180 00
" 29 " 30-16 "	25 50	" 63 " 64-16 "	204 00
" 31 " 32-16 "	27 00	" 71 " 72-16 "	228 00
	31 50		276 00

The usual twist for ship augers from 6 to 8-16 inch is from 7 1/2 to 9 1/2 inches. Sizes from 9 to 17-16 inch, the twist will run about 12 inches. Sizes from 18 to 30-16 inch will average about 15 inch twist. Boxes of one-half dozen.

SHIP AUGERS WITH RINGS.

FIG. 1116.



Sizes 1/2 inch and under	per dozen, \$	Sizes 29 and 30-16 inch	per dozen, \$
" 9 and 10-16 inch	8 25	" 31 " 32-16 "	29 70
" 11 " 11-16 "	9 90	" 33 " 34-16 "	34 65
" 13 " 14-16 "	11 55	" 35 " 36-16 "	52 80
" 15 " 16-16 "	13 20	" 37 " 38-16 "	66 00
" 17 " 18-16 "	14 85	" 39 " 40-16 "	79 20
" 19 " 20-16 "	16 50	" 41 " 42-16 "	92 40
" 21 " 22-16 "	18 15	" 43 " 44-16 "	105 60
" 23 " 24-16 "	19 80	" 45 " 46-16 "	118 80
" 25 " 26-16 "	23 10	" 47 " 48-16 "	132 00
" 27 " 28-16 "	26 40	" 59 " 60-16 "	145 20
	28 05		224 40

Sizes 71 and 72-16 inch, per dozen, \$303.60.

These augers are designed especially for boring hard wood. In ordering, be particular to state whether wanted with or without screw.

L'HOMMEDIEU'S SINGLE TWIST SHIP AUGER, PATTERN No. 34.

DESIGNED FOR HARD WOOD.

FIG. 1117.

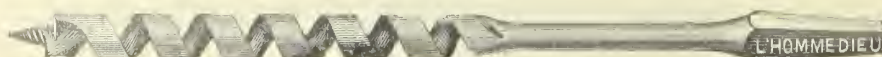


8	9	10	11	12	13	14	15	16	17	18	20	24	28	32-16ths inch
\$8.25	9.00	10.00	10.75	11.50	12.50	13.25	14.00	15.00	15.75	16.50	18.20	23.10	28.00	34.50 per dozen

L'HOMMEDIEU'S SHIP AUGER BITS.

WITH OR WITHOUT SCREWS.

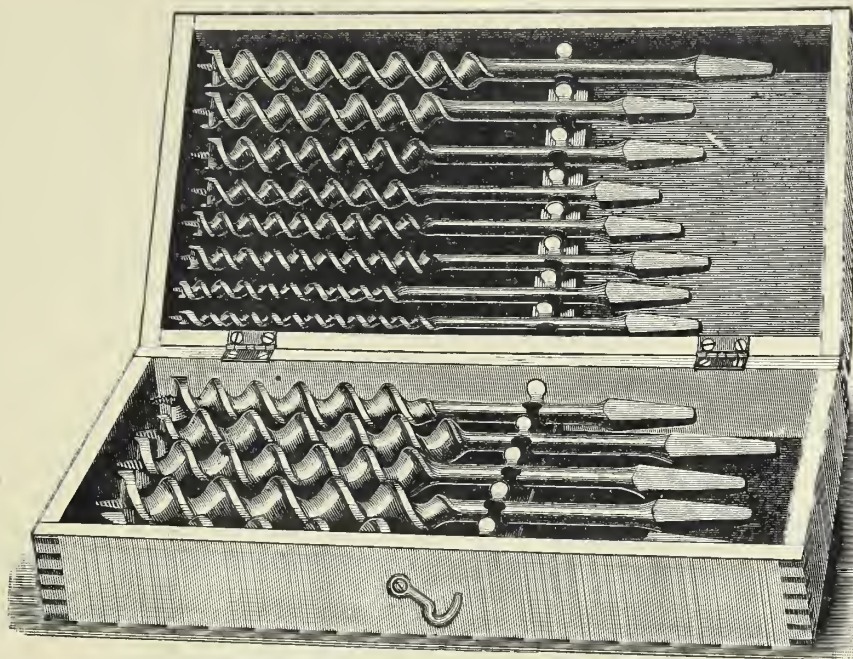
FIG. 1118.



2-16 to 8-16	9 and 10	11 and 12	13 and 14	15 and 16	17 and 18	19 and 20-16ths inch
\$6 00	7.50	9.00	10 50	12.00	13.50	15.00 per dozen

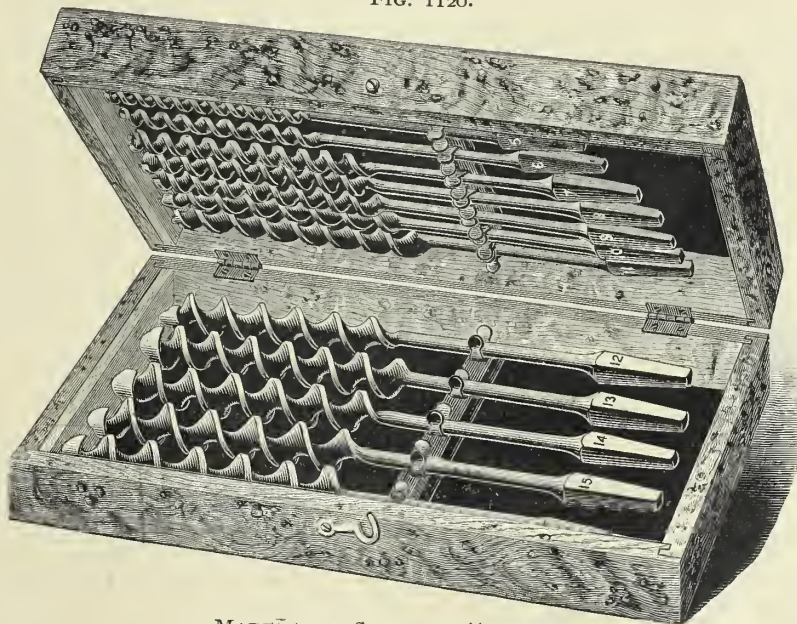
SUPERIOR QUALITY AUGER BIT SETS.

FIG. 1119.



- Packed in maple boxes, well finished, with rack to hold one auger bit of each size. This illustration represents sets Nos. 10 and 30.
- | | | |
|--------------|--|--------|
| No. 10 set. | Improved pattern extension lip, full polished, 13 bits, 32½ quarters, one each, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16-16 inches, per set, | \$5.50 |
| No. 14½ set. | Improved pattern extension lip, full polished, 9 bits, 20½ quarters, one each, 4, 5, 6, 7, 8, 10, 12, 14, 16-16 inches, per set, | 4.00 |
| No. 14 set. | Improved pattern extension lip, full polished, 9 bits, 18 quarters, one each, 4, 5, 6, 7, 8, 9, 10, 11, 12-16 inches, per set, | 3.50 |
| No. 16 set. | Improved pattern extension lip, full polished, 6 bits, 14 quarters, one each, 4, 6, 8, 10, 12, 16-16 inches, per set, | 2.75 |
| No. 30 set. | Improved lip and spur, full polished, 13 bits, 32½ quarters, per set, | 3.75 |
| No. 34½ set. | Improved lip and spur, full polished, 9 bits, 20½ quarters, per set, | 3.00 |
| No. 40 set. | Improved lip and spur, full polished, 9 bits, 18 quarters, per set, | 2.50 |
| No. 42 set. | Improved lip and spur, full polished, 6 bits, 14 quarters, per set, | 2.25 |

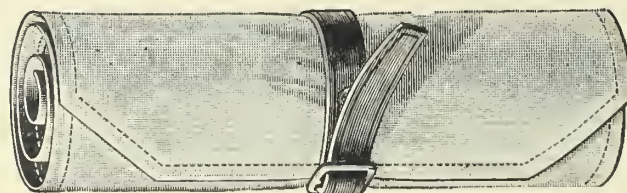
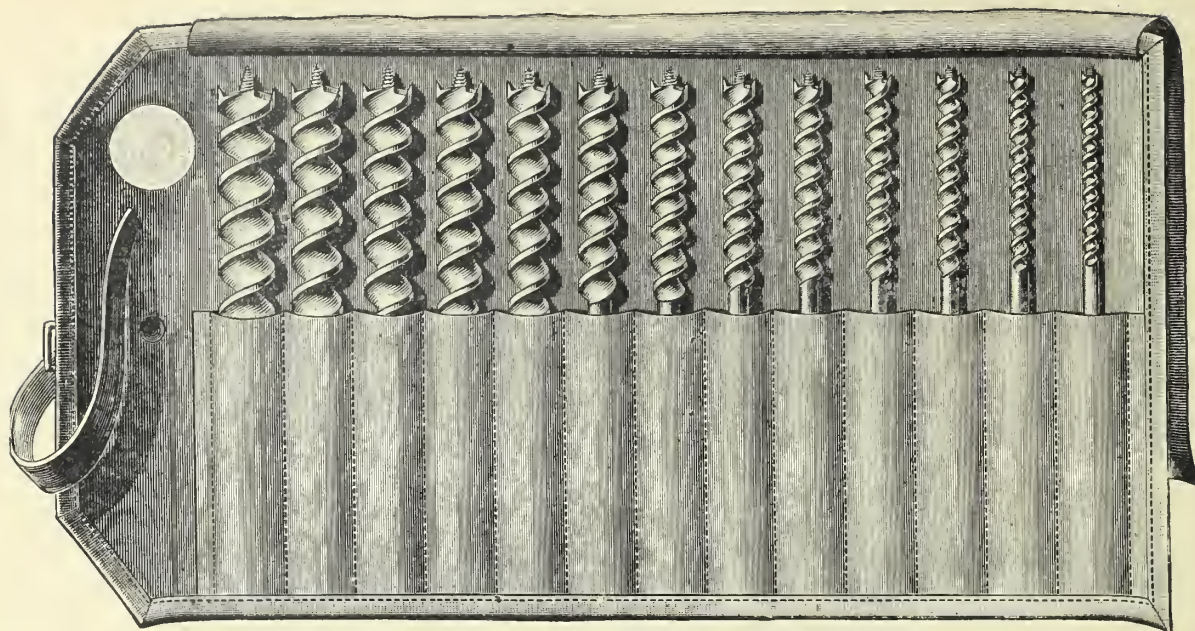
FIG. 1120.



MADE FROM SELECTED TOOL STEEL.

- Packed in birds eye maple boxes, cabinet finish, with a spring to hold one auger bit of each size, from 4 to 16-16ths. This illustration represents sets Nos. 610, 915, 630, 630B and 635.
- | | | |
|---------------|---|--------|
| No. 610 set. | Improved pattern extension lip, full polished, 13½ quarters, one each, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16-16 inches, per set, | \$6.25 |
| No. 615 set. | Improved pattern extension lip, straw finish, 13 bits, 32½ quarters, | 6.50 |
| No. 630 set. | Improved lip and spur, full polished, 13 bits, 32½ quarters, | 4.25 |
| No. 630B set. | Improved lip and spur, Stubb's finish, made from special steel, 13 bits, 32½ quarters, | 6.50 |
| No. 635 set. | Improved lip and spur, royal blue finish, 13 bits, 32½ quarters, | 3.00 |

FIG. 1121.

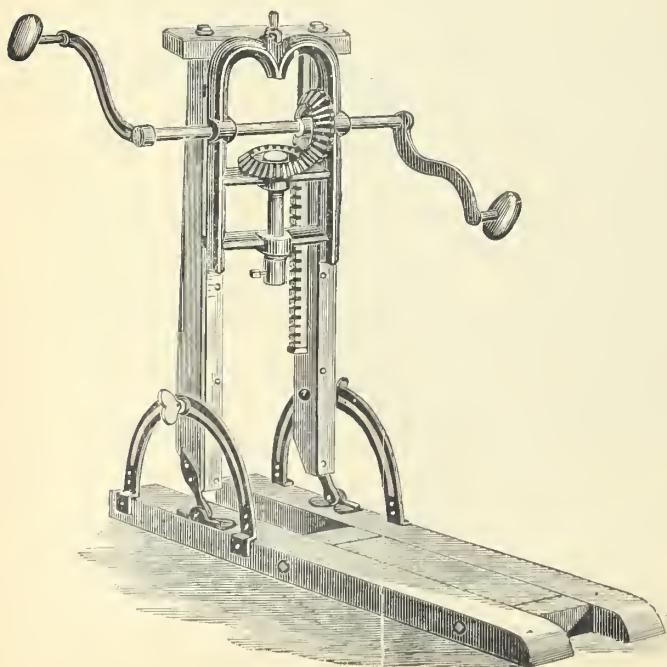


SUPERIOR QUALITY AUGER BIT SETS.

PACKED IN FLEXIBLE CANVAS ROLLS.

No. Set.		Per Set.
710.	Improved pattern extension lip, full polished, 13 bits, 32½ quarters, one each, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16-16 inch,	\$6 25
715.	Improved pattern extension lip, straw finish, 13 bits, 32½ quarters,	6 50
730.	Improved lip and spur, full polished, 13 bits, 32½ quarters,	4 25
730B.	Improved lip and spur, Stubbs' finish, made from special steel, 13 bits, 32½ quarters,	6 50

FIG. 1122.



BORING MACHINES.

This illustration represents the No. 1 machine. All the parts of this machine are made in the best manner.

No.		Each.
4.	Upright, without augers,	\$5 50
1.	Angular, without augers,	6 75
4.	Upright, with our extra boring machine augers, sets of 18-4,	10 00
1.	Angular, with our extra boring machine augers, sets of 18-4,	11 25
4.	Upright, with our extra boring machine augers, sets of 41-4,	15 75
1.	Angular, with our extra boring machine augers, sets of 41-4,	17 00

CLARK'S FULL POLISHED SLEEVE BRACES.

No. 80.	8 inch sweep, maple or cherry head and handle.	Per doz., \$4 50
No. 100.	10 inch sweep, maple or cherry head and handle.	Per doz., 5 00
No. 112.	12 inch sweep, maple or cherry head and handle.	Per doz., 5 50
No. 130.	8 inch sweep, maple or cherry head and handle, plated,	Per doz., 8 00
No. 140.	10 inch sweep, maple or cherry head and handle, plated,	Per doz., 8 50
No. 145.	12 inch sweep, maple or cheery head and handle, plated,	Per doz., 9 00

BALL BRACES.

No. 250.	8 inch sweep.	Per doz.,	\$2 50
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One-half dozen packages.

FIG. 1123.

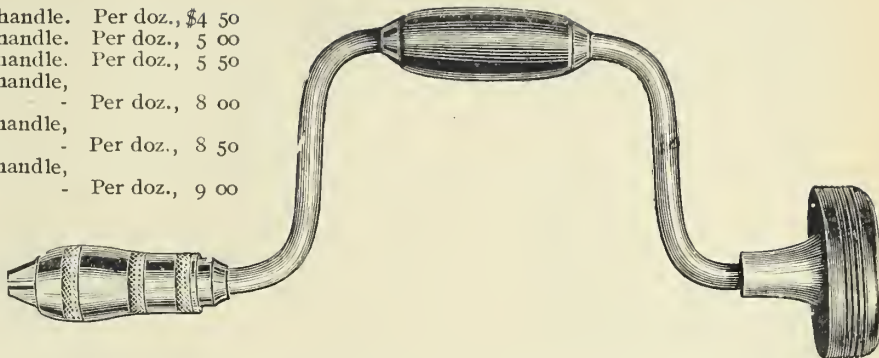
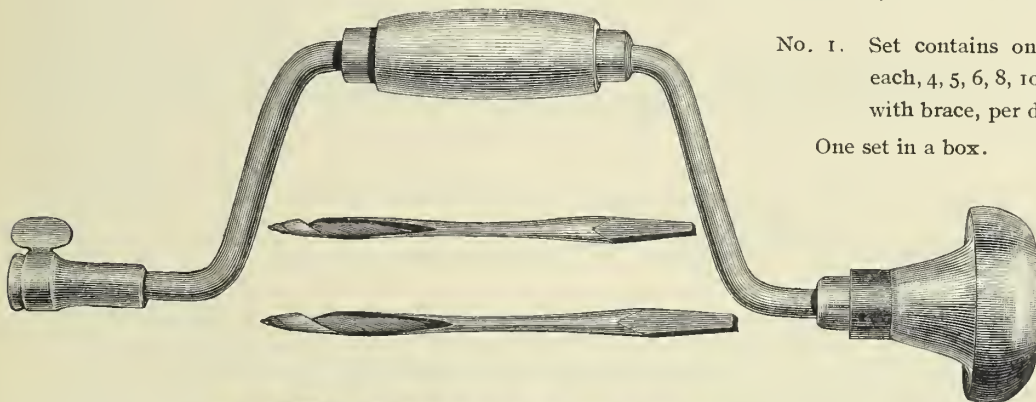


FIG. 1124.

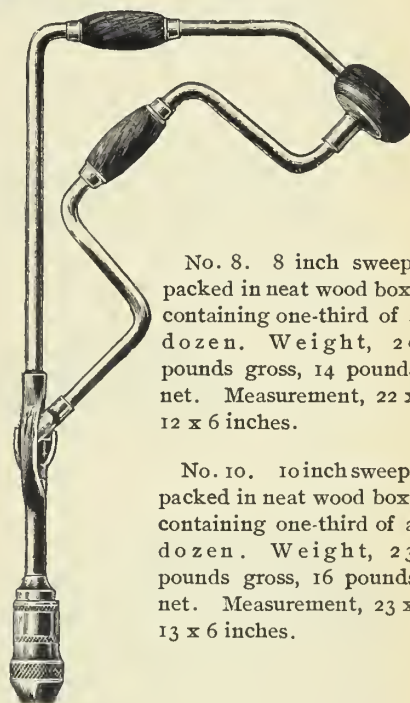


No. 1. CLARK TOOL COMPANY'S BRACE AND BIT SETS.

No. 1. Set contains one solid cast steel boring bit, each, 4, 5, 6, 8, 10 and 16-16ths inch. Complete, with brace, per dozen sets, - - - \$24 00
One set in a box.

IMPROVED PATENT CORNER BRACE.

FIG. 1125.

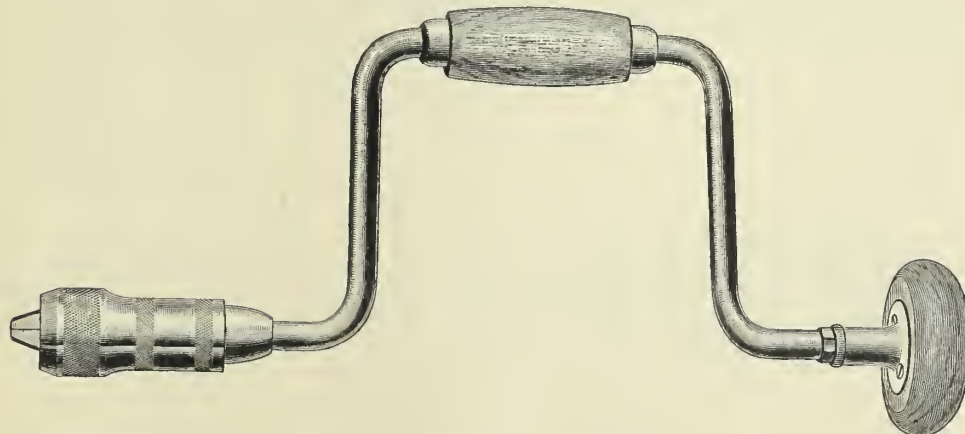


No. 8. 8 inch sweep, packed in neat wood box, containing one-third of a dozen. Weight, 20 pounds gross, 14 pounds net. Measurement, 22 x 12 x 6 inches.

No. 10. 10 inch sweep, packed in neat wood box, containing one-third of a dozen. Weight, 23 pounds gross, 16 pounds net. Measurement, 23 x 13 x 6 inches.

GOODELL'S IMPROVED BIT BRACES.

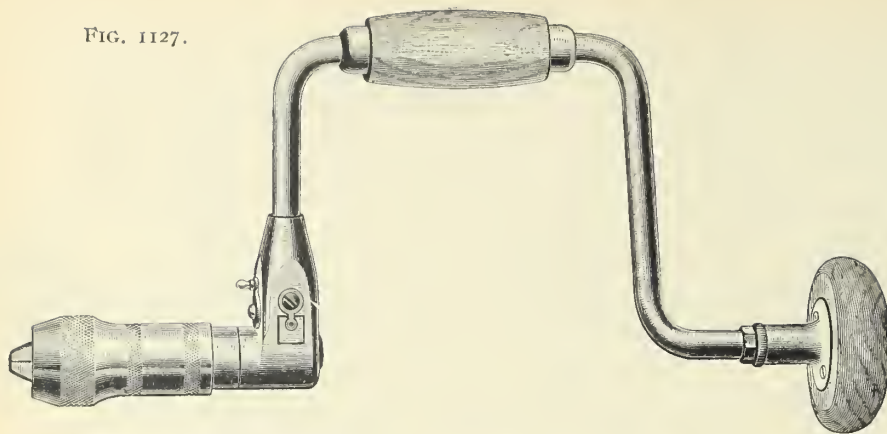
FIG. 1126.



No. 0.	14 inch sweep.	Per dozen,	- - - \$33 00	No. 2.	10 inch sweep.	Per dozen,	- - - 27 00
No. 1.	12 inch sweep.	Per dozen,	- - - 30 00	No. 3.	8 inch sweep.	Per dozen,	- - - 24 00

Forged steel, sweep and jaws, full polished and nickel-plated, with cocobolo handle and lignumvitæ head.

FIG. 1127.

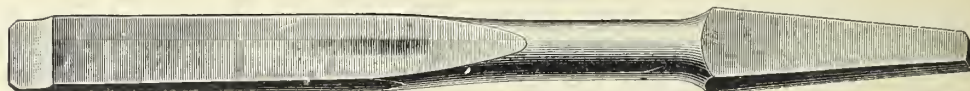


GOODELL'S IMPROVED RATCHET BRACES.

No. 10.	14 inch sweep.	Per dozen,	-	\$42 00
No. 11.	12 inch sweep.	Per dozen,	-	39 00
No. 12.	10 inch sweep.	Per dozen,	-	36 00
No. 13.	8 inch sweep.	Per dozen,	-	33 00

Forged steel, sweep and jaws, full polished and nickel-plated, new design, conveniently operated, strong and durable.

FIG. 1128.



SCREW DRIVER BITS.

Nos. 100, 200 and 300. Per dozen, \$2 75
No. 500. Assorted Per dozen, 2 75

These Screw Driver Bits are designed for fine mechanics' use, and are fully warranted.

FIG. 1129.



SHEPARDSON'S ROUND SCREW DRIVER BITS.

Best tool steel. Assorted. Per dozen, - \$2 00

FIG. 1130.



SHEPARDSON'S SCREW DRIVER BITS. BEST CAST STEEL, WITH SPRING TEMPER.

No 0	1	2	3	Assorted 0 to 3
\$1 25	1 40	1 60	1 80	1 50 per dozen

FIG. 1131.



SHEPARDSON'S CABINET SCREW DRIVER BITS.

6 inch.	Per dozen,	\$2 25	8 inch.	Per dozen,	\$2 50
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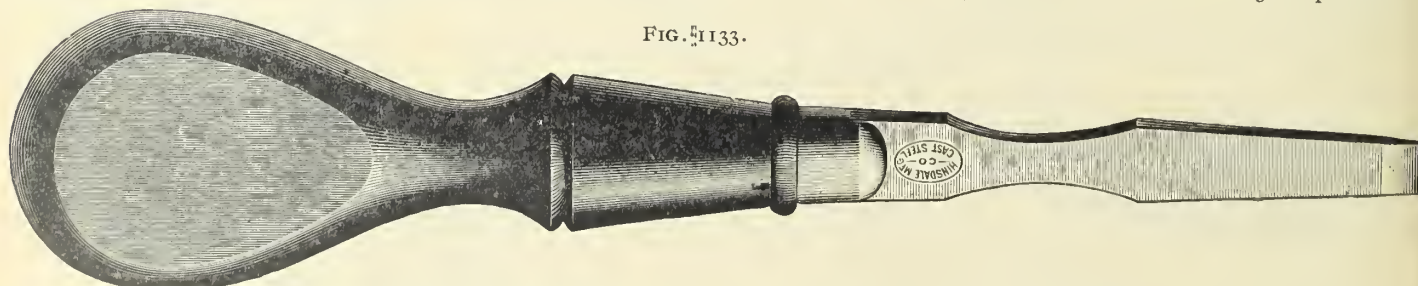
FIG. 1132.



THE CHAMPION MACHINISTS' SCREW DRIVER.

12	15	18	24	30 inches.
\$14 00	16 00	18 00	24 00	30 00 per dozen

FIG. 1133.



HINSDALE BEECHWOOD HANDLE. No. 70.

1 1/2	2	3	4	5	6	7	8	9	10	12 inches
\$2 00	2 00	2 75	3 00	3 50	4 00	5 00	5 50	6 50	8 50	10 50 per dozen
2	3	4	5	6	7	8				10 inches.
\$1 60	2 15	2 65	3 20	3 75	4 30	5 50				8 00 per dozen

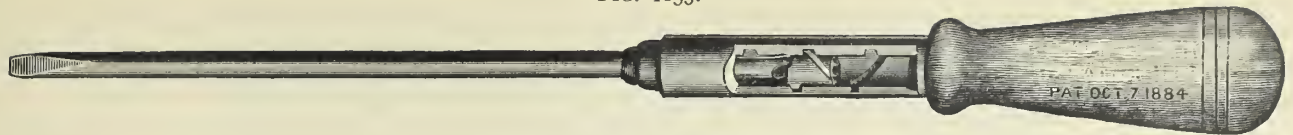
SCREW DRIVERS. No. 80.

FORGED BLADES. BRASS FERRULES.

CAST STEEL.

SCREW DRIVERS.

FIG. 1135.



"EUREKA" SPIRAL SCREW DRIVER.

Best steel blades. Seamless brass tubes.

No. 1.	14 inches long when open, 9 inches when closed, blades 1-4 inch wide,	-	-	-	-	-	per dozen, \$20 00
" 2.	19 inches long when open, 12 inches when closed, blades 5-16 inch wide,	-	-	-	-	-	" " 24 00

FIG. 1136.

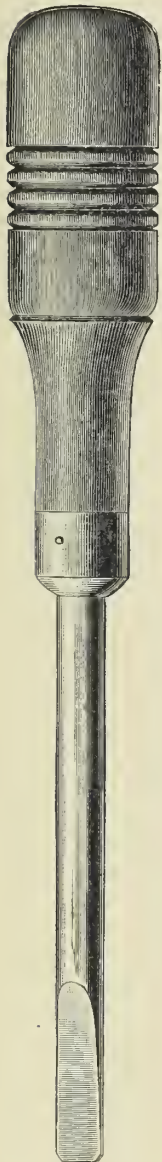


FIG. 1137.

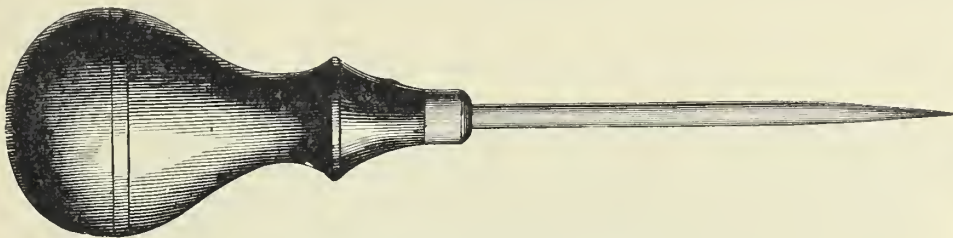


FIG. 1138.

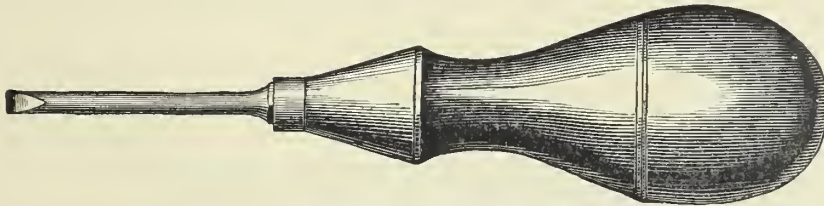


PLAIN HANDLED SCRATCH AWLS.

No. 10.	Regular, assorted,	-	-	-	-	-	per gross, \$7 00
" 20.	Large, assorted,	-	-	-	-	-	" " 8 00

Boxes of one dozen.

FIG. 1139.



HANDLED BRAD AWLS.

No. 40.	Regular, with Plain Handles, assorted,	-	-	-	-	per gross, \$7 00
" 45.	Large, with Plain Handles, assorted,	-	-	-	-	" " 8 00
" 50.	Regular, with Black Handles, Nickel Ferrule, assorted,	-	-	-	-	" " 9 00
" 55.	Large, with Black Handles, Nickel Ferrule, assorted,	-	-	-	-	" " 10 00
" 60.	Large, with Black Handles, Nickel Ferrule, assorted, with hand-made Awls,	-	-	-	-	" " 12 00

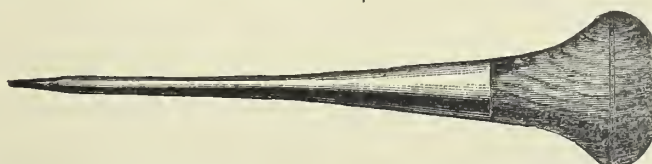
FIG. 1140.



SOCKET SCRATCH AWLS.

No. 35.	Old pattern,	-	-	-	-	-	per dozen, \$1.25
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FIG. 1141.



"SAMSON." No. 85.

Inch.	Per dozen.
2	\$2 00
3	2 50
4	3 00
5	3 50
6	4 00
8	5 50
9	6 00
10	6 50

No. 25.	Regular Pattern, Standard size,	-	-	-	-	per dozen, \$1 50
" 30.	Regular Pattern, Extra Large,	-	-	-	-	" " 2 00

"MONARCH." No. 808

Inch.	Per dozen.
2	\$2 00
3	2 50
4	3 00
5	3 50
6	4 00
7	5 00
8	5 50
9	6 00
10	6 50
12	9 00

FIG. 1142.

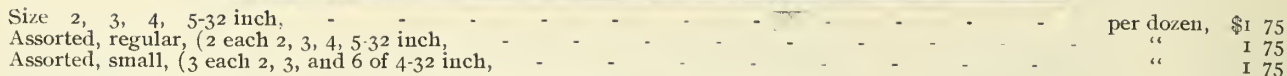
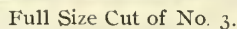


FIG. 1143.



Full Size of Rivet Set Holes.

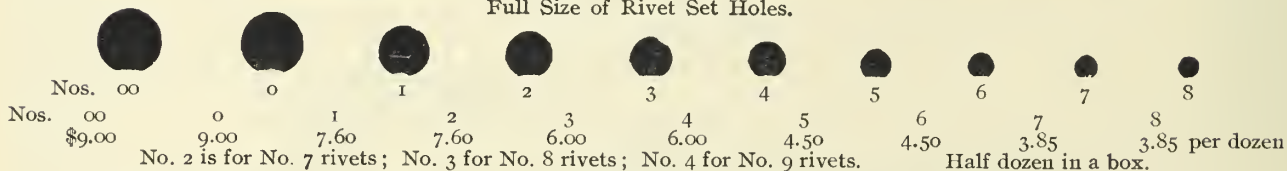
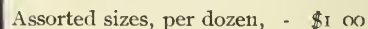


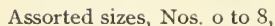
FIG. 1144.

PRICK PUNCHES, SQUARE
PATTERN.



SOLID PUNCHES, SQUARE PATTERN.

FIG. 1145.



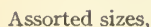
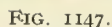
per dozen, \$1 00

Also packed, solid sizes, as follows :

Solid punches, Nos.	-	-	-	0	1	2	3	4
Size of iron rivet each No. fits,	-	-	-	12 lb.	10 lb.	8 lb.	6 lb.	4 lb.
Size of punches,	-	-	-	9-32	8-32	7-32	6-32	5-32
Solid punches, Nos.	-	-	-	-	5	6	7	8
Size of iron rivet each No. fits,	-	-	-	-	2 lb.	1 lb.	12 oz.	8 oz.
Size of punches,	-	-	-	-	4-32	3-32	2-32	3-64

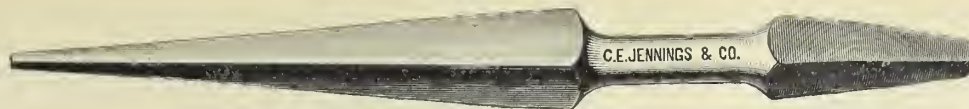
OCTAGON PRICK AND SOLID PUNCHES.

FIG. 1146.



per dozen, \$1 25

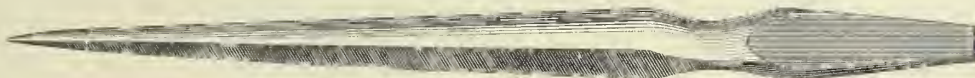
FIG. 1148.

**REAMERS.**

No. 6. Square, extra quality, per dozen,

\$2.75

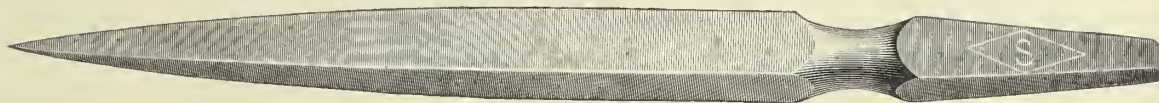
FIG. 1149.



No. 8. Half round, extra quality, per dozen,

\$2.75

FIG. 1150.

**SQUARE REAMERS.**

Extra quality tool steel, warranted, per dozen,

\$2.00

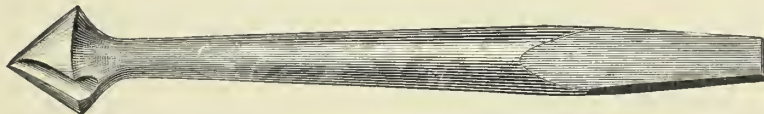
FIG. 1151.

**CAST STEEL REAMERS.**

No. 5. Square, per dozen,

\$1.50

FIG. 1152.

**COUNTERSINKS.****SNAIL COUNTERSINKS FOR WOOD.**No. 001. Improved $\frac{1}{2}$, $\frac{5}{8}$ inch, per dozen,

\$2.25

No. 001. Improved $\frac{3}{4}$ inch, per dozen,

2.75

No. 001. Improved 1 inch, per dozen,

3.50

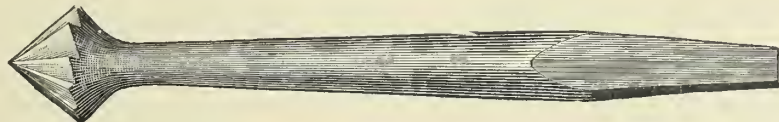
No. 001. Improved assorted, per dozen,

2.25

No. 01. Single cut, standard quality, per dozen,

1.50

FIG. 1153.

**ROSE COUNTERSINKS FOR BRASS.**

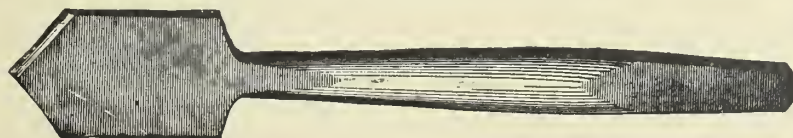
No. 002. Extra quality, per dozen,

\$2.75

No. 02. Standard, per dozen,

1.50

FIG. 1154.

**FLAT COUNTERSINKS FOR IRON.**

No. 004. Extra quality, per dozen,

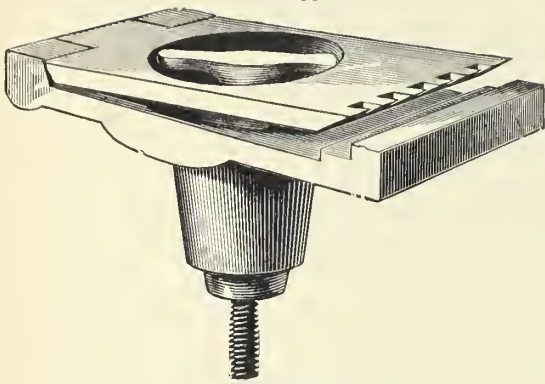
\$2.75

No. 04. Standard, per dozen,

1.50

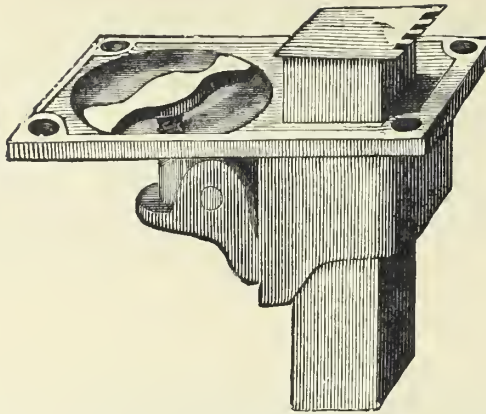
BENCH HOOKS.

FIG. 1155.



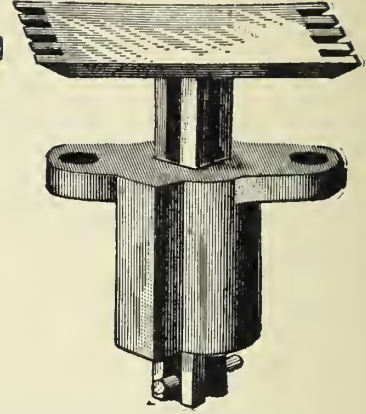
No. 20. Weston Pattern.
Per dozen, - - - \$5.50

FIG. 1156.



No. 10. Weston Pattern.
Per dozen, - - - \$8.00

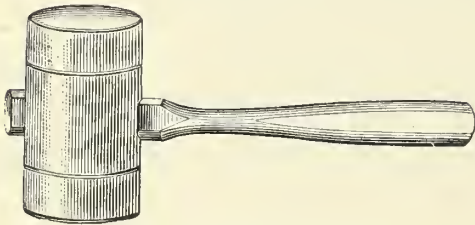
FIG. 1157.



No. 25. New Pattern.
Per dozen, - - - \$4.50

MALLETs.

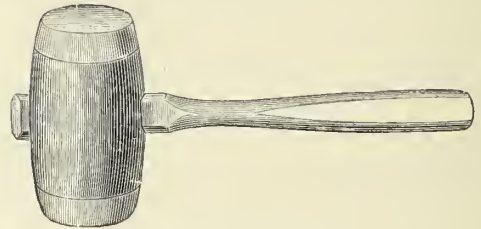
FIG. 1158.



No. 2. Mortised Handles.

No.		Per Doz.
1.	Round Hickory, Mortised, 5 in. long, 3 in. diam.	\$1.50
2.	Round Hickory, Mortised, 5½ in. long, 3½ in. diam.	- 2.00
3.	Round Hickory, Mortised, 6 in. long, 4 in. diam.	- 2.50
5.	Round Lignumvitæ, Mortised, 5 in. long, 3 in. diam.	- 3.00
6.	Round Lignumvitæ, Mortised, 5½ in. long, 3½ in. diam.	- 4.00
7.	Round Lignumvitæ, Mortised, 6 in. long, 4 in. diam.	- 5.00

FIG. 1161.

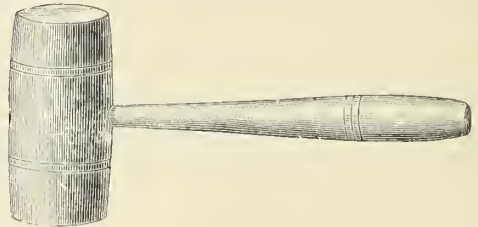


Mortised Handles.

No.		Per Doz.
15.	Round Iron Mallet, Mortised, Hickory Ends, 2½ in. diam., - - -	\$4.00

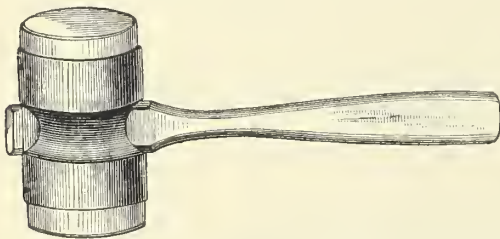
TINNERS' MALLETs.

FIG. 1162.



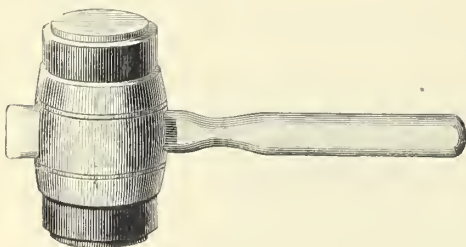
No.		Per Doz.
4.	Round Hickory, 5½ in. long, assorted, 2¼ and 2½ in. diam., - - -	\$1.00

FIG. 1159.



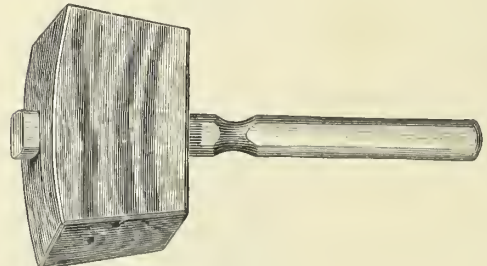
No.		Per Doz.
16.	Round Mallet, Heavy Malleable Iron Socket, Mortised Hickory Ends, 3 in. diam., - - -	\$7.50

FIG. 1160.



No.		Per Doz.
14.	Round Mallet, Mortised, Iron Rings, 6 in. long, 4 in. diam., - - -	\$5.50
14½.	Round Mallet, Mortised, Iron Rings, 5½ in. long, 3½ in. diam., - - -	\$4.00

FIG. 1163.



No.		Per Doz.
8.	Square Hickory, Mortised, 6 in. long, 2½ x 3½ in.	\$2.00
9.	Square Hickory, Mortised, 6½ in. long, 2¾ x 3¾ in.	2.50
10.	Square Hickory, Mortised, 7 in. long, 3 x 4 in.	- 3.00
11.	Square Lignumvitæ, Mortised, 6 in. long, 2½ x 3½ in.	3.75
12.	Square Lignumvitæ, Mortised, 6½ in. long, 2¾ x 3¾ in.	4.75
13.	Square Lignumvitæ, Mortised, 7 in. long, 3 x 4 in.	- 5.75

COE'S KNIFE HANDLE SCREW WRENCH.

FIG. 1164.

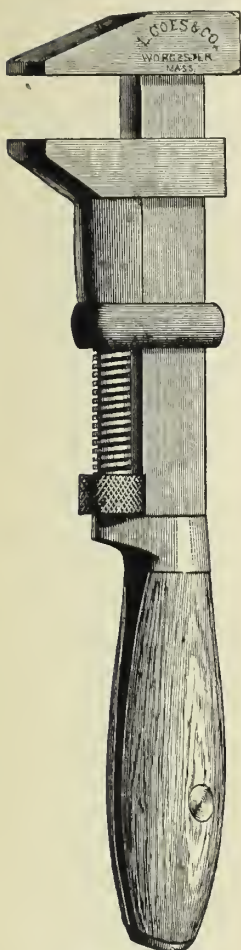
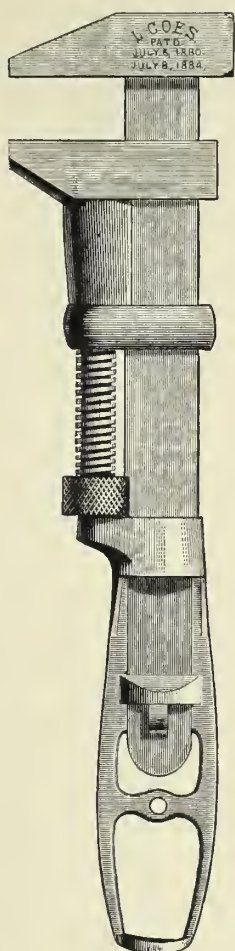


FIG. 1165.



BLACK.

Size.	6 inch,	8	10	12	15	18	21	Per Doz.
6 inch,	-	-	-	-	-	-	-	\$9 00
8 "	-	-	-	-	-	-	-	10 00
10 "	-	-	-	-	-	-	-	12 00
12 "	-	-	-	-	-	-	-	14 00
15 "	-	-	-	-	-	-	-	24 00
18 "	-	-	-	-	-	-	-	30 00
21 "	-	-	-	-	-	-	-	36 00

BRIGHT.

Size.	4 inch,	6	8	10	12	15	18	21	Per Doz.
4 inch,	-	-	-	-	-	-	-	-	\$10 00
6 "	-	-	-	-	-	-	-	-	10 00
8 "	-	-	-	-	-	-	-	-	11 00
10 "	-	-	-	-	-	-	-	-	14 00
12 "	-	-	-	-	-	-	-	-	16 00
15 "	-	-	-	-	-	-	-	-	26 00
18 "	-	-	-	-	-	-	-	-	32 00
21 "	-	-	-	-	-	-	-	-	38 00

OPENING CAPACITY OF EACH SIZE WRENCH.

Size wrench,	4	6	8	10	12	15	18	21 inches
Will open,	$\frac{1}{2}$	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{3}{8}$	3	$4\frac{1}{8}$ "

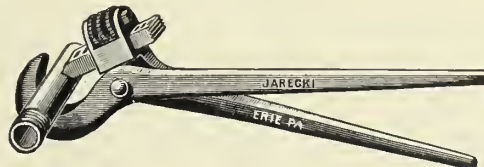
COMMON PIPE TONGS.

Sizes,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$ inches
Price,	\$0 60	.65	.70	.75	.90	1.10	1.30 each
Sizes,	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5 inches
Price,	\$1.50	1.90	2.50	3.50	4.50	6.00	8.00 each

BROWN'S ADJUSTABLE PIPE TONGS.

No.	Takes pipe	to	Each.
1	$\frac{1}{8}$ to $\frac{3}{4}$	-	\$1 30
" 1 1/2	$\frac{3}{8}$ to 1	-	1 65
" 2	$\frac{1}{2}$ to $1\frac{1}{4}$	-	2 00
" 3	1 to 2	-	3 00
" 4	$1\frac{1}{2}$ to 3	-	6 00
" 5	$2\frac{1}{2}$ to 4	-	11 00
" 6	3 to 5	-	25 00
" 7	4 to 7	-	35 00

FIG. 1166.



JARECKI ADJUSTABLE PIPE TONGS.

No.	Grips gas burner,	to	to $\frac{3}{4}$ inch,	Each.
" 1	Grips gas burner,	$\frac{1}{8}$ to 1	"	\$3 00
" 2	Grips gas burner,	$\frac{1}{4}$ to $1\frac{1}{2}$	"	3 50
" 3	Grips gas burner,	$\frac{1}{2}$ to $2\frac{1}{2}$	"	4 00
" 4	Grips gas burner,	$\frac{3}{4}$ to $3\frac{1}{2}$	"	5 00
" 5	Grips gas burner,	$2\frac{1}{2}$ to 6	"	9 00
				10 00

ENGINEERS' COMBINED NUT AND PIPE WRENCH.

FIG. 1167.

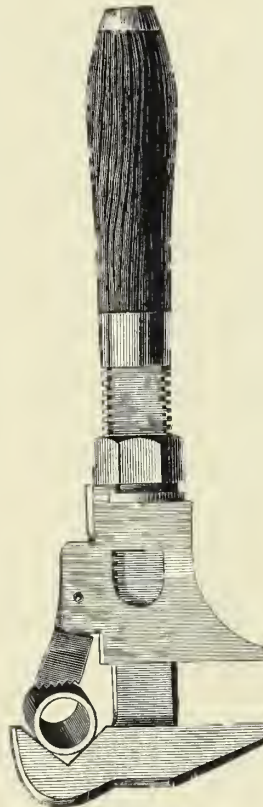
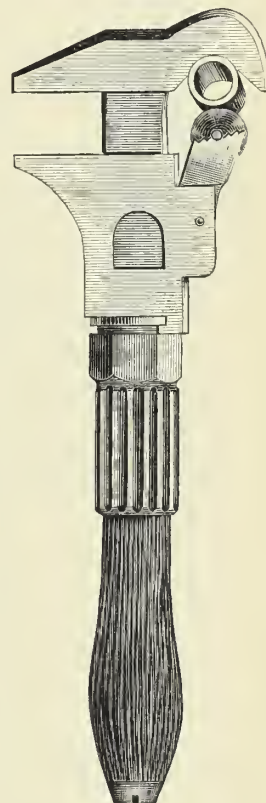


FIG. 1168.



SHORT NUT.

Size wrench,	10 inch,	12 inch,	15 inch,	per dozen,
Will open,	$\frac{1}{2}$	$\frac{7}{8}$	$1\frac{1}{4}$	\$23 00
				26 00
				37 00

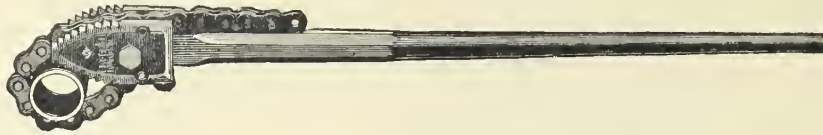
LONG SLEEVE NUT.

Size wrench,	10 inch,	12 inch,	15 inch,	18 inch,	21 inch,	per dozen,
Will open,	$\frac{1}{2}$	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$2\frac{1}{8}$	\$25 25
						28 50
						40 50
						72 00
						84 00

BROCK'S PATENT DROP-FORGED CHAIN PIPE WRENCH,

For Gripping, Turning, or Holding Pipe, Bolts, Bars, Shafts, or Round Surfaces from 1/8 to 12 Inches in Diameter. Made in Seven Sizes.

FIG. 1169.



Nos. 2, 3, 3 1/2, 4 and 5.

DESCRIPTIVE PRICE LIST.

Size, - - -	No. 0.	No. 1.	No. 2.	No. 3.	No. 3 1/2.	No. 4.	No. 5.
Price, each, - - -	\$2.50	3.50	5.50	7.50	9.00	11.00	18.00
Capacity, size pipe, -	1/8 to 3/4 in.	1/8 to 1 1/2 in.	1/4 to 2 1/2 in.	3/4 to 4 in.	1 to 6 in.	1 1/2 to 8 in.	2 to 12 in.
Length, - - -	12 1/2 in.	20 in.	27 in.	37 in.	44 in.	50 in.	64 in.
Length Chain, - - -	8 1/2 in.	14 in.	17 1/2 in.	22 in.	30 in.	34 in.	48 in.
Weight, - - -	1 1/4 lbs.	4 1/2 lbs.	8 lbs.	15 lbs.	20 lbs.	28 lbs.	47 lbs.
Extra Chain, each, -	\$0.75	1.00	1.50	2.50	3.25	4.00	6.00
Extra Jaws, pair, -	\$1.00	1.75	2.75	4.00	4.75	5.50	7.50
Chain tested to - -	3,000 lbs.	5,500 lbs.	9,500 lbs.	11,000 lbs.	13,000 lbs.	15,000 lbs.	20,000 lbs.

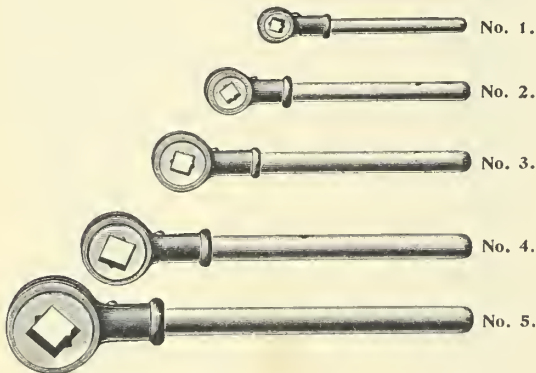
STILLMAN'S PATENT WRENCH.

Length, open, in inches, -	6	8	10	14	18	24	36	48
Takes from, - - -	1/8 in. wire to 1/2 in. pipe.	1/8 in. wire to 3/4 in. pipe.	1/8 in. wire to 1 in. pipe.	1/4 in. wire to 1 1/2 in. pipe.	1/4 in. wire to 2 in. pipe.	1/4 in. wire to 2 1/2 in. pipe.	1/2 in. pipe to 3 1/2 in. pipe.	1 in. pipe to 5 in. pipe.
Price, - - -	\$2.00	\$2.00	\$2.25	\$3.00	\$4.00	\$6.00	\$12.00	\$18.00
Jaws, - - -	67	67	75	1.00	1.33	2.00	4.00	6.00
Frames, - - -	25	25	33	45	55	65	75	1.00
Nuts, - - -	20	20	27	35	42	50	65	80

The Six-inch Wrench, with Screw Driver Attachment on end of handle, \$2.37. Nickel Plated, 38 cents extra.

LITTLE GIANT RATCHET NUT WRENCHES.

FIG. 1170.



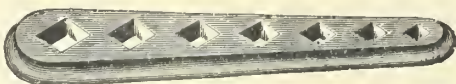
LIST OF LENGTHS, SIZES AND PRICES.

No. of Wrench.	Size of Nut.	Whole Length.	Price of Handle.	Price of Socket.	Price Complete.
1	3-16 & 1-4 in.	7 in.	\$0.45	\$0.30	\$0.75
2	5-16 & 3-8 in.	8 in.	60	40	1.00
3	7-16 & 1-2 in.	10 in.	75	50	1.25
4	5-8 & 3-4 in.	13 in.	1.40	60	2.00
5	7-8 & 1 in.	16 in.	2.25	75	3.00

For the use of blacksmiths and carriage makers. For the removal of nuts, the above tool will be found a most convenient one. It is complete in itself. Is strong and thoroughly made. When ordering, give number of the wrench wanted.

STEEL DOG WRENCH.

FIG. 1171.



Fitting screw heads from 3/8 to 1/2 inch square. Will answer for both Dogs and Tool Post.
Price, - - - \$0.75

"ACME" STEEL WRENCHES.

BRIGHT STANDARD WRENCHES.

6 inch.	8 inch.	10 inch.	12 inch.	15 inch.	18 inch.	21 inch.
\$9.00	10.00	12.00	14.00	24.00	30.00	36.00 per doz.

ALL NICKEL WRENCHES.

6 inch.	8 inch.	10 inch.	12 inch.	15 inch.	18 inch.	21 inch.
\$10.80	12.60	15.00	18.00	28.00	36.00	57.00 per doz.

"ACME" STEEL COMBINATION PIPE, BOLT AND NUT WRENCH.

10 inch—size of pipe, 1/8 to 2 inches,	- - -	per dozen, \$24.00
12 inch—size of pipe, 1/4 to 2 1/2 inches,	- - -	" 30.00
15 inch—size of pipe, 1/4 to 3 1/2 inches,	- - -	" 36.00

BAXTER S WRENCHES.

Length, inches, -	4	6	8	10	12
Each, - - -	\$0.50	.75	1.00	1.50	2.00

THE "TRIMO" PIPE WRENCHES.

Length, opens,	6	8	10	14 inches
Takes from	1/8 to 1/2	1/8 to 3/4	1/8 to 1	1/4 to 1 1/2 inch pipe
Price, each,	\$2.00	2.00	2.25	3.00
Length, opens,	18	24	36	48 inches
Takes from	1/4 to 2	1/4 to 2 1/2	1/2 to 3 1/2	1 to 5 inch pipe
Price, each,	\$4.00	6.00	12.00	18.00

LIGHTNING WRENCHES.

Made of forged steel, polished.

10 inch, per dozen,	-	-	-	-	\$18.00
12 inch, per dozen,	-	-	-	-	24.00

STRAIGHT SINGLE END WRENCHES.

FIG. 1172.

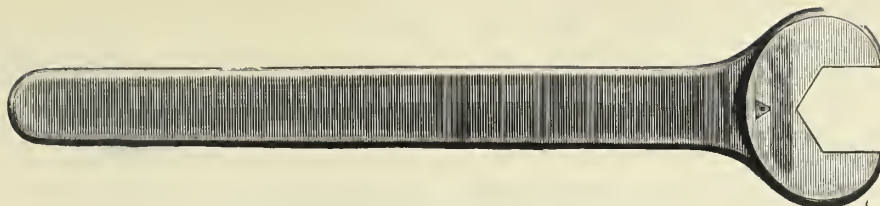


FIG. 1173.

FIG. 1174.

STANDARD MACHINE WRENCHES.

Drop-Forged of Bar Steel.

SINGLE END WRENCHES FOR STANDARD HEXAGON NUTS.

No.	Length. Inches.	Thickness of Head. Inches.	For Standard Hex. Nuts for Bolts.	FINISHED.		UNFINISHED.	
				Size of Opening.	Price.	Size of Opening.	Price.
46	5½	⅜	1-4	1-2	\$0 24	15-32	\$0 12
47	6	⅜	5-16	19-32	30	9-16	15
48	6½	⅜	3-8	11-16	36	21-32	18
49	7½	½	7-16	25-32	40	3-4	20
50	8¾	½	1-2	7-8	50	27-32	25
51	9½	⅝	9-16	31-32	60	15 16	30
52	11	⅝	5-8	1 1-16	70	1 1-32	35
53	12	¾	3-4	1 1-4	80	1 7-32	40
54	14	¾	7-8	1 7-16	90	1 13-32	45
55	15	⅞	1	1 5-8	1 20	1 19-32	60
56	17¼	⅞	1½	1 13-16	1 50	1 25-32	75
57	18½	1	1¾	2	2 00	1 31-32	1 00
58	19½	1⅛	1⅝	2 3-16	2 50	2 5-32	1 25
59	20½	1⅛	1½	2 3-8	3 20	2 11-32	1 60
60	22	1¼	1⅝	2 9-16	4 00	2 17-32	2 00
61	24	1¼	1¾	2 3-4	5 00	2 23 32	2 50

DOUBLE END WRENCHES FOR STANDARD HEXAGON NUTS.

No.	Length. Inches.	Thickness of Head. Inches.	For Standard Hex. Nuts for Bolts.	FINISHED.		UNFINISHED.	
				Size of Opening.	Price.	Size of Opening.	Price.
62	6	⅜	1-4 & 5-16	1-2 & 19-32	\$0 40	15-32 & 9-16	\$0 20
63	7¼	⅜ & ½	3-8 & 7-16	11-16 & 25-32	50	21-32 & 3-4	25
64	9½	½ & ⅝	1-2 & 9-16	7-8 & 31-32	70	27-32 & 15-16	35
65	12	⅝ & ¾	5-8 & 3 4	1 1-16 & 1 1-4	1 00	1 1-32 & 1 7-32	50
66	15½	¾ & ⅞	7-8 & 1	1 7-16 & 1 5 8	1 30	1 13-32 & 1 19-32	65
67	19	⅞ & 1	1 1-8 & 1 1-4	1 13-16 & 2	2 50	1 25-32 & 1 31-32	1 25
68	21½	1⅞	1 3-8 & 1 1-2	2 3-16 & 2 3-8	4 00	2 5-32 & 2 11-32	2 00
69	24	1¼	1 5-8 & 1 3-4	2 9-16 & 2 3-4	6 00	2 17-32 & 2 23-32	3 00

NEW LINE DROP-FORGED, ANGLE END, MACHINE WRENCHES.

SINGLE END WRENCHES FOR STANDARD HEXAGON NUTS.

No.	Length. Inches.	Thickness of Head. Inches.	Size of Opening.	FINISHED.		UNFINISHED.	
				Price.		Size of Opening.	Price.
90	3	5-32	5-16	\$0 16		9-32	\$0 08
91	3⅜	5-32	13-32	18		3-8	09
92	5	1-4	1-2	20		15-32	10
93	5⅝	1-4	19-32	24		9-16	12
94	6½	5-16	11-16	28		21-32	14
95	7½	5-16	25-32	34		3-4	17
96	8¾	7-16	7-8	40		27-32	20
97	9¼	7-16	31-32	50		15-16	25
98	10	9-16	1 1-16	64		1 1-32	32
99	11¾	9-16	1 1-4	80		1 7-32	40
100	13⅞	3-4	1 7-16	1 00		1 13-32	50
101	14¾	3-4	1 5-8	1 30		1 19-32	65
102	16¾	15-16	1 13-16	1 70		1 25-32	85
103	18½	15-16	2	2 20		1 31-32	1 10
104	20¼	1 1-8	2 3-16	2 80		2 5-32	1 40
105	22¼	1 1-8	2 3-8	3 50		2 11-32	1 75
106	25	1 3-16	2 9-16	4 20		2 17-32	2 10
107	28	1 3-16	2 3-4	5 00		2 23-32	2 50

DOUBLE END WRENCHES FOR STANDARD HEXAGON NUTS.

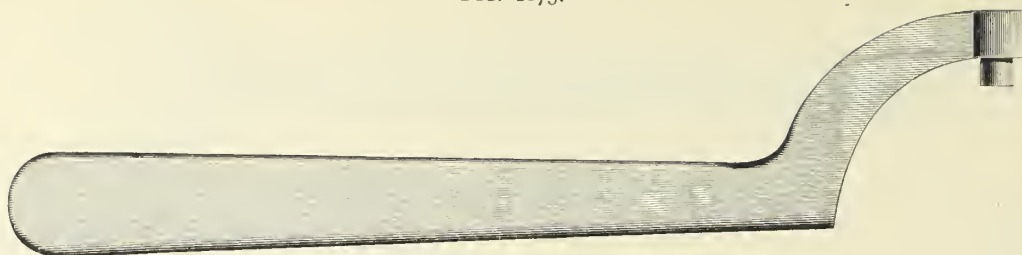
No.	Length. Inches.	Thickness of Head. Inches.	Size of Opening.	FINISHED.		UNFINISHED.	
				Price.		Size of Opening.	Price.
108	3	5-32	5-16 & 13-32	\$0 24		9-32 & 3-8	\$0 12
109	5	1-4	1-2 & 19-32	36		15-32 & 9-16	18
110	6½	5-16	11-16 & 25-32	50		21-32 & 3-4	25
111	7	3-8	11-16 & 7-8	60		21-32 & 27-32	30
112	9	7-16	7-8 & 31-32	70		27-32 & 15-16	35
113	12	9-16	1 1-16 & 1 1-4	1 00		1 1-32 & 1 7-32	50
114	15	3-4	1 7-16 & 1 5-8	1 60		1 13-32 & 1 19-32	80
115	19	15-16	1 13-16 & 2	2 50		1 25-32 & 1 31-32	1 25
116	21	1 1-8	2 3-16 & 2 3-8	4 00		2 5-32 & 2 11-32	2 00
117	24	1 3-16	2 9-16 & 2 3-4	6 00		2 17-32 & 2 23-32	3 00

ANGLE END
MACHINE
WRENCHES.

ANGLE END
MACHINE
WRENCHES.

WRENCHES.

FIG. 1175.



SPANNER WRENCH.

CHUCK WRENCHES.

6 inches, forgings, 7-16,	-	-	-	-	25 cents
9 inches, forgings, 15-32,	-	-	-	-	35 cents
6 inches, finished 7-16.	-	-	-	-	40 cents
9 inches, finished, 15-32,	-	-	-	-	50 cents

Forgings are broached out to same size as finished.

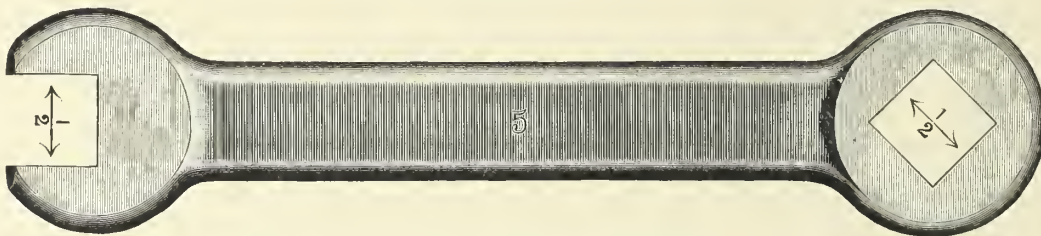
SPANNER WRENCHES.

Four Sizes, Nos. 1, 2, 3 and 4.

No. 1 Circle, 2 inches,	-	-	30 cents each,	} Forgings only.
No. 2 Circle, 2½ inches,	-	-	30 cents each,	
No. 3 Circle, 3 inches,	-	-	-	
No. 4 Circle, 4 inches,	-	-	-	

30 cents each
35 cents each

FIG. 1176.



BOX TOOL POST WRENCHES.

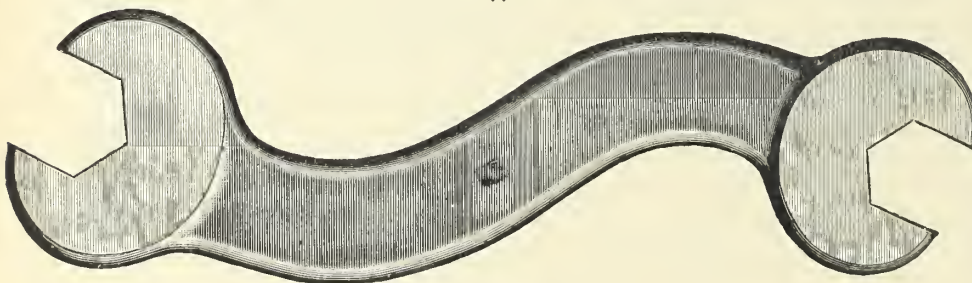
No. 4. Unfinished,	-	-	\$0 40
No. 4. Finished,	-	-	60

No. 5. Unfinished,	-	-	\$0 35
No. 5. Finished,	-	-	50

No. 6. Unfinished,	-	-	\$0 50
No. 6. Finished,	-	-	70

Forging or unfinished sizes are 1-64 less.

FIG. 1177.



HEXAGON S WRENCHES.

The size of finished openings on list shows the largest sizes the openings can be finished.

No.	Length Inches.	Thick- ness of Head, Inches.	FINISHED. Size Opening.	Price.	UNFINISHED. Size Opening.	Price.
70	4	1/4	3/8 and 7/8	\$0 20	1/2 and 3/4	\$0 10
71	5	1/4	1/2 and 1 1/8	30	1/2 and 1/2	15
72	6	3/8	3/4 and 1 1/8	40	1/2 and 3/4	20
73	7	1/2	1 and 1 1/8	50	1/2 and 3/4	25
74	8	1/2	1 and 1 1/8	60	1/2 and 3/4	30
75	9	1/2	1 1/8 and 1 1/4	70	1/2 and 1	35

We also finish these wrenches to following sizes for standard nuts:

No. 71,	-	-	1/2 and 1 1/8	-	-	Price, \$0 30
No. 72,	-	-	1/2 and 1 1/8	-	-	Price, 40
No. 73,	-	-	3/4 and 1 1/8	-	-	Price, 50
No. 74,	-	-	1 and 1 1/8	-	-	Price, 60
No. 75,	-	-	1 1/8 and 1 1/4	-	-	Price, 70

In ordering finished wrenches state which sizes are wanted, the regular or standard.

FINISHED WRENCHES FOR SET SCREWS.

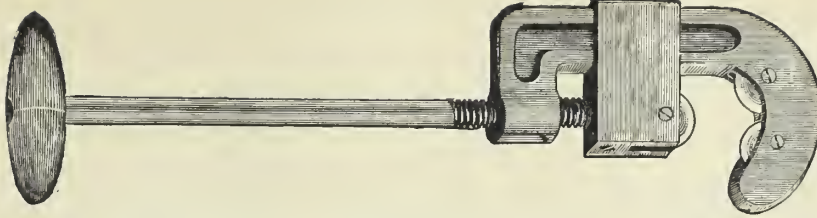
Only furnished in finished sizes

No.	In.	Head.	Size Opening.	Price.
84	4	1/4	1/8 and 3/8	\$0 20
85	5	1/4	1/8 and 1/2	30
86	6	3/8	1/8 and 3/8	40
87	7	1/2	1/8 and 3/4	50
88	8	1/2	1/8 and 7/8	60
89	9	1/2	1/8 and 1	70

New line of Double End Wrenches to finish for Standard Hexagon or Square Nuts. These wrenches are lighter than any before made, and are intended to meet the wants of our customers for a light wrench.

No.	Length, Inches.	Thickness of Head, Inches.	For Standard Hexagon Nuts for Bolts.	FINISHED, Size Opening.	Price.	UNFINISHED Size Opening.	Price.
76	4½	1/4	3/8 and 1/4	3/8 and 1/2	\$0 30	3/8 and 1/2	\$0 15
77	5¾	3/8	1/2 and 3/8	1/2 and 1/2	40	1/2 and 3/8	20
78	7	1/2	3/8 and 1/2	1/2 and 7/8	50	1/2 and 1/2	25
79	8	1/2	1/2 and 1/2	1/2 and 3/4	60	3/4 and 1/2	30
80	9¼	3/8	1/2 and 3/8	1/2 and 1 1/8	70	7/8 and 1	35
81	10½	1/2	3/8 and 3/8	1 1/8 and 1 1/8	90	1 1/8 and 1 1/8	45

FIG. 1178.



THE "MODEL" THREE-WHEEL PIPE CUTTER.

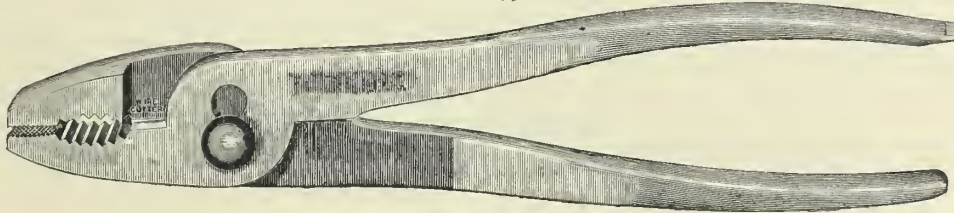
This tool is valuable for working in corners, against the wall, between floors, etc., as the wheels cut both sides of the pipe at the same time.

No. 1 cuts	$\frac{1}{8}$ to 1 inch pipe, each,	-	-	\$4.50	Extra wheels, each,	-	-	-	-	\$0.25
No. 2 cuts	$\frac{1}{2}$ to 2 inch pipe, each,	-	-	6.00	Extra wheels, each,	-	-	-	-	.30
No. 3 cuts	$1\frac{1}{2}$ to 3 inch pipe, each,	-	-	10.00	Extra wheels, each,	-	-	-	-	.40
No. 4 cuts	3 to 4 inch pipe, each,	-	-	20.00	Extra wheels, each,	-	-	-	-	.50
No. 5 cuts	4 to 6 inch pipe, each,	-	-	30.00	Extra wheels, each,	-	-	-	-	.75

ONE WHEEL PIPE CUTTERS.

No. 1 cuts	$\frac{1}{8}$ to 1 inch pipe, case hardened,	\$1.50	Steel faced,	\$1.75	Cutter blocks with wheels,	\$0.40	Wheels, each,	\$0.12
No. 2 cuts	1 to 2 inch pipe, case hardened,	2.25	Steel faced,	2.50	Cutter blocks with wheels,	.60	Wheels, each,	.18
No. 3 cuts	2 to 3 inch pipe, case hardened,	7.00	Steel faced,	7.50	Cutter blocks with wheels,	1.00	Wheels, each,	.25

FIG. 1179.

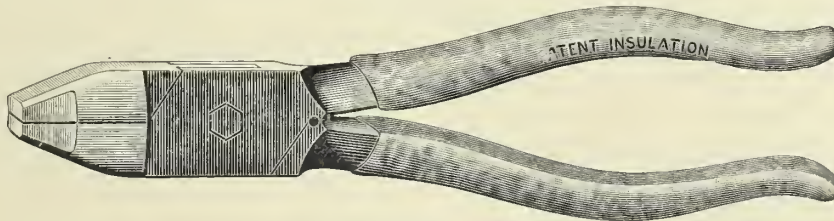


GAS PLIERS, WIRE CUTTERS, WRENCH AND SCREW-DRIVER COMBINED.

This cut represents 10 inch pliers one-half size.

6 inch, black finish, per dozen,	-	-	\$13.50	Nickel plated, per dozen,	-	-	\$15.00
10 inch, black finish, per dozen,	-	-	18.00	Nickel plated, per dozen,	-	-	21.00

FIG. 1180.



SAFETY PLIERS.

BURNER PLIERS, PATENT INSULATION.

Insulated burner pliers, 7 inches, per dozen,	-	-	-	-	-	-	\$15.00
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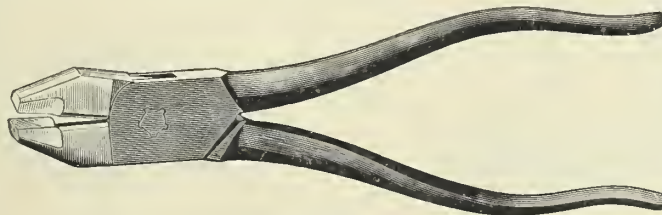
SIDE CUTTING PLIERS, PATENT INSULATION—TOOLS OF THE HIGHEST GRADE AND BEST QUALITY.

For the use of linemen, electricians and others who wish to cut wires heavily charged with electricity. Tested to insulate against a current of 2,500 volts.

The insulated covering is not brittle and will not flake off. The tool is of solid cast steel.

6 inches, per dozen,	\$25.00	7 inches, per dozen,	\$33.00	8 inches, per dozen,	-	\$40.00
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FIG. 1181.



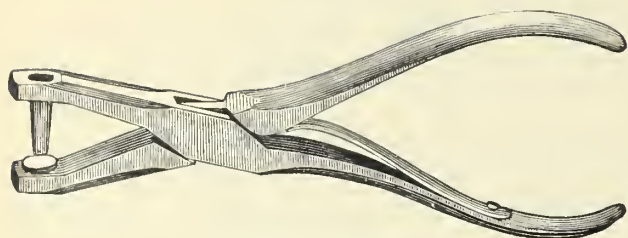
CAST STEEL PLIERS.

SOLID CAST STEEL SIDE CUTTING PLIERS, WITH RAISED CUTTER, NICKEL PLATED.

5 inches, per dozen,	\$14.50	6 inches, per dozen,	\$15.50	7 inches, per dozen,	\$19.50	8 inches, per dozen,	\$22.50
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SPRING AND SADDLERS' PUNCHES.

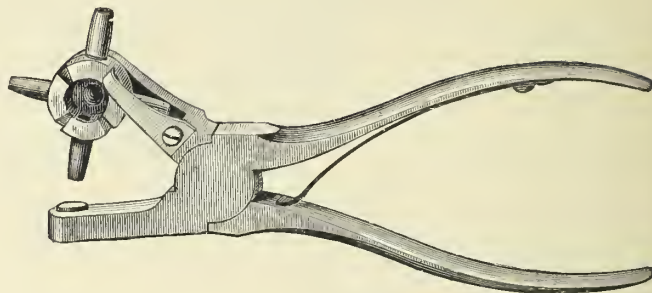
FIG. 1182.



SPRING PUNCHES.
FULL SIZE OF HOLES.

Nos 3 4 5 6 7 8 9

FIG. 1183.



REVOLVING SPRING PUNCHES.

No. 20.	Assorted tubes.	-	Per doz.,	\$6 00
No. 21.	Assorted tubes, with 1 extra tube for each.	-	Per doz.,	7 50
No. 22.	Assorted tubes, with 2 extra tubes for each.	-	Per doz.,	9 00
No. 23.	Assorted tubes, with 3 extra tubes for each.	-	Per doz.,	10 50
Extra tubes, assorted.		-	Per doz.,	1 50

No. 34.	Four tubes, assorted sizes.	Per dozen,	-	\$20 00
No. 36.	Six tubes, assorted sizes.	Per dozen,	-	24 00
Half dozen in a box.				

SADDLERS' PUNCHES.

FIG. 1184.



Full Size Cut of No. 6.

FULL SIZE OF HOLES.

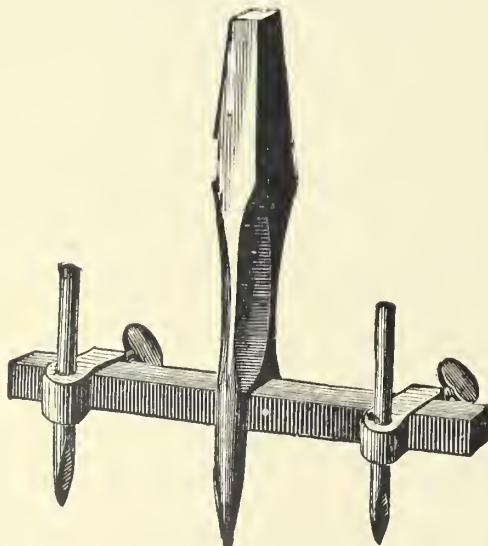


Nos 1 2 3 4 5 6 7 8 9 10 12

Nos. 1	2	3	4	5	6	7	8	9	10	12	14
\$2 00	2 00	2 00	2 00	2 00	2 25	2 25	2 25	2 25	2 50	3 00	6 00 per dozen
Assorted, from No. 1 to 6. Per dozen,					Assorted, from No. 7 to 10. Per dozen,						
					One dozen in a box.						

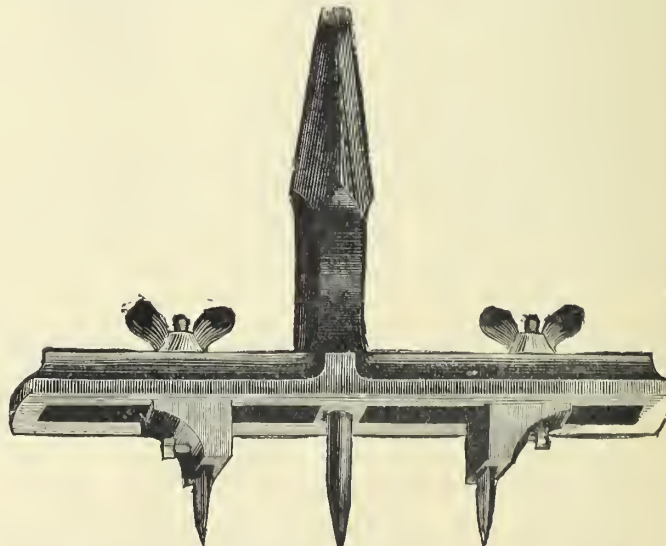
WASHER CUTTERS.

FIG. 1185.



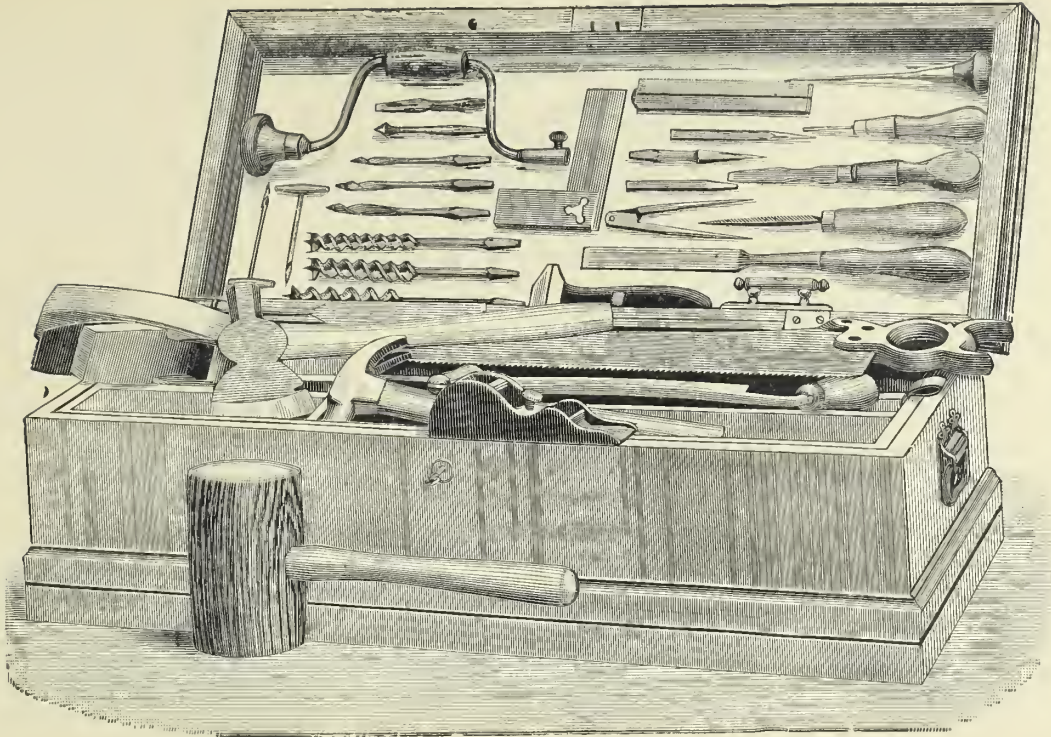
No. 4. Standard quality, round steel blades. Per dozen, \$11 00
Boxes of one-half dozen. Cases of ten dozen.

FIG. 1186.



No. 5. Extra quality, steel blades. Per dozen, \$16 00
Boxes of one-half dozen. Cases of three dozen.

FIG. 1187.



MODEL TOOL CHEST, No. 80.

Chest 2 feet 6 inches long, outside; 1 foot 3 inches wide; 11½ inches deep. Made of extra quality and heavy hard woods, nicely finished in oil and varnished, dove-tailed corners, extra heavy and ornamental base, with two large inside sliding drawers, and partitions and saw rack, with extra strong folding handles, and tumbler chest lock.

Every tool in this chest is warranted. It contains 130 useful articles.

This is the most complete assortment of useful and good quality tools ever placed on the market in a tool chest. Our object in making up this assortment is to place tools of our own manufacture in the hands of the consumer.

CONTENTS OF No. 80.

1 block plane, with best steel irons.	1 wing divider.	1 oil stone.
1 smooth plane, with best steel irons.	1 nail set.	4 steel screw-drivers, assorted sizes.
1 jack plane, with best steel irons.	1 reamer.	1 auger, with ring and handle.
1 fore plane, with best steel irons.	1 try square.	1 pair gas pliers.
1 steel hatchet.	1 T bevel.	1 pair flat nose pliers.
1 mallet.	1 pair cutting nippers.	1 cast steel trowel.
1 wrench.	1 glue pot, complete with brush and glue.	1 can opener.
1 spirit level.	1 cast steel panel saw.	1 patent saw set.
1 bit brace, with automatic jaws, for carpenters' use.	1 cast steel hack saw, with 13 blades.	1 saddler's spring punch.
1 cast steel hammer.	13 auger bits, assorted sizes.	1 saddler's belt punch.
12 C. E. Jennings & Co.'s cast steel firmer chisels, handled.	12 double-cut bits, assorted sizes.	1 washer cutter.
2 cast steel gouges.	12 German pattern bits, assorted sizes.	1 tack claw.
1 cast steel drawing knife.	1 screw-driver bit.	1 patent handle, containing 10 cast steel useful tools.
1 mill file.	2 cast steel gimlets.	12 handled brad awls.
1 taper file.	1 boxwood rule.	1 steel box opener.
	1 zinc oiler.	1 handy vise.

Complete, - - - - - each, \$70 00

Tool chests made to order with any assortment of tools required.

TOOL CHEST, No. 60.

Chest, 30 inches long; 15 inches wide; 11½ inches deep, outside. Made of hardwood; finished with a neat moulding and patent locked corners; complete, with lock and key, and forty good quality tools, in addition to one hollow handle containing 10 brad awls and tools.

No. 60.	Chests, complete,	-	-	-	-	each,	\$30 00
No. 65.	Chests, complete, with same tools for mechanics' use,	-				"	40 00

TOOL CHEST, No. 55.

Made of hardwood, with a neat moulding and patent locked corners. Fitted with tumbler lock. Made with drawer at bottom with lock, and two inside sliding trays.

Every tool in these chests is warranted to be of good quality.

Length of chest, 22 inches ; width, 13 inches ; depth, 12 inches.

Contains thirty good quality tools in addition to one hollow handle containing ten small tools.

CONTENTS OF No. 55.

1 panel saw.	1 steel nail set.	1 try square.
1 smooth plane.	3 steel auger bits.	1 taper file, with handle.
1 boxwood rule.	1 block plane.	1 steel hatchet.
1 spike gimlet.	1 mallet.	1 cast steel hammer.
1 nail gimlet.	1 glue pot with glue.	2 steel gimlet bits.
1 bit brace.	1 pair gas pliers.	1 steel countersink, for wood.
1 wrench.	1 pair nippers.	1 divider.
1 steel screw-driver.	1 spirit level.	1 oiler.
2 solid cast steel chisels.	1 drawing knife.	1 tool handle containing 10 useful tools
Complete,	-	each, \$20 00

TOOL CHEST, No. 50.

Same Chest as No. 45, with 27 tools, in addition to one hollow handle containing 10 useful tools.

[illegible]

TOOL CHEST, No. 45.

Made of hardwood, finished with a neat moulding and patent locked corners, complete with lock and key and partition tray.

Length of chest, 26 inches; width, 14½ inches; depth, 10½ inches, outside; contains 21 useful tools in addition to one hollow tool handle, containing 10 small tools.

Complete,	-	-	-	-	-	-
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each, \$10.00

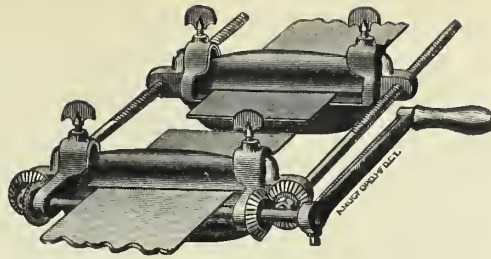
EMPTY TOOL CHESTS.

Made of hardwood with heavy moulding and patent locked corners. Complete with lock and key.

No. 135.	18 x 10 x 7½ inches, black walnut moulding, with partition tray,	-	-	-	-	each,	\$3 00
No. 150.	26 x 14½ x 10½ inches, black walnut moulding, with partition tray,	-	-	-	-	each,	4 50
No. 126.	22 x 13 x 12 inches, black walnut moulding, machinist's, with 2 sliding trays and bottom draw with lock,	-	-	-	-	each,	7 00
No. 160.	30 x 15 x 11½ inches, black walnut moulding, with 2 sliding trays and saw rack,	-	-	-	-	each,	15 00
No. 127.	35½ x 21 x 18 inches, plain moulding, with two sliding trays and saw rack,	-	-	-	-	each,	12 00

All the sizes given are outside measure.

FIG. 1188.



GARDNER & MILLER'S PATENT BELT CLAMP.

FOR DRAWING BELTS TOGETHER FOR THE PURPOSE OF LACING THEM.

8 inches,	-	-	-	-	\$14 00	24 inches,	-	-	-	-	\$30 00
12 inches,	-	-	-	-	18 00	28 inches,	-	-	-	-	34 00
16 inches,	-	-	-	-	22 00	32 inches,	-	-	-	-	38 00
20 inches,	-	-	-	-	26 00	36 inches,	-	-	-	-	44 00

The above cut represents one of the most complete and useful articles for those using belts of a width requiring to be drawn together and laced while upon the pulleys.

PRICE LIST OF LEATHER BELTING.

ADOPTED APRIL 17, 1895.

Width.	Prices per Running Foot.	Width.	Price per Running Foot.
1 inch	\$0 12	18 inches	\$3 00
1 1/4 inches	16	19 inches	3 20
1 1/2 inches	20	20 inches	3 40
1 3/4 inches	24	21 inches	3 60
2 inches	28	22 inches	3 80
2 1/4 inches	32	23 inches	4 00
2 1/2 inches	36	24 inches	4 20
3 inches	44	26 inches	4 60
3 1/2 inches	52	28 inches	5 00
4 inches	60	30 inches	5 50
4 1/2 inches	68	32 inches	6 00
5 inches	76	34 inches	6 50
5 1/2 inches	84	36 inches	7 00
6 inches	92	40 inches	7 80
7 inches	1 08	44 inches	8 60
8 inches	1 24	48 inches	9 40
9 inches	1 40	50 inches	9 80
10 inches	1 56	52 inches	10 20
11 inches	1 72	54 inches	10 60
12 inches	1 88	56 inches	11 00
13 inches	2 04	60 inches	11 80
14 inches	2 20	64 inches	12 60
15 inches	2 40	68 inches	13 40
16 inches	2 60	72 inches	14 40
17 inches	2 80		

Double belts twice the price of single.

ROUND RUBBER BELTING.

	Per Foot.		Per Foot.
1/4 inch	\$0 14	3/4 inch	\$0 38
3/8 inch	17	7/8 inch	48
1/2 inch	20	1 inch	59
5/8 inch	27	1 1/4 inch	80

RUBBER BELTING.

Width in Inches.	3 Ply Per Foot.	5 Ply Per Foot.	7 Ply Per Foot.	9 Ply Per Foot.	11 Ply Per Foot.
1	\$0 08				
1 1/4	10				
1 1/2	13				
2	17	\$0 19	\$0 24		
2 1/2	20	25	29		
3	25	29	31		
3 1/2	29	34	41		
4	34	38	47		
4 1/2	37	44	53		
5	40	48	58		
6	48	58	69	\$0 86	
7	57	67	81	1 01	
8	66	78	94	1 17	\$1 40
9	75	89	1 06	1 31	1 58
10	84	1 00	1 19	1 48	1 78
11	93	1 11	1 31	1 64	1 97
12	1 01	1 20	1 45	1 80	2 19
13	1 11	1 31	1 58	1 97	2 37
14	1 20	1 42	1 71	2 14	2 57
15	1 29	1 53	1 85	2 30	2 77
16	1 39	1 67	1 98	2 47	2 97
18	1 57	1 89	2 25	2 80	3 37
20	1 76	2 11	2 51	3 13	3 77
22	1 96	2 36	2 80	3 50	4 20
24	2 18	2 62	3 11	3 89	4 67
26		2 89	3 42	4 28	5 13
28		3 16	3 73	4 67	5 60
30			4 04	5 05	6 06
32			4 30	5 44	6 53
34			4 67	5 83	7 00
36			4 98	6 22	7 46
38			5 29	6 61	7 93
40			5 60	7 00	8 40
42			5 91	7 39	8 86
44			6 22	7 77	9 33
46			6 53	8 16	9 79
48			6 84	8 55	10 26
50				8 94	10 73
52				9 33	11 19

DISSTON'S PATENT GULLET TOOTH CIRCULAR SAW.

FIG. 1189.

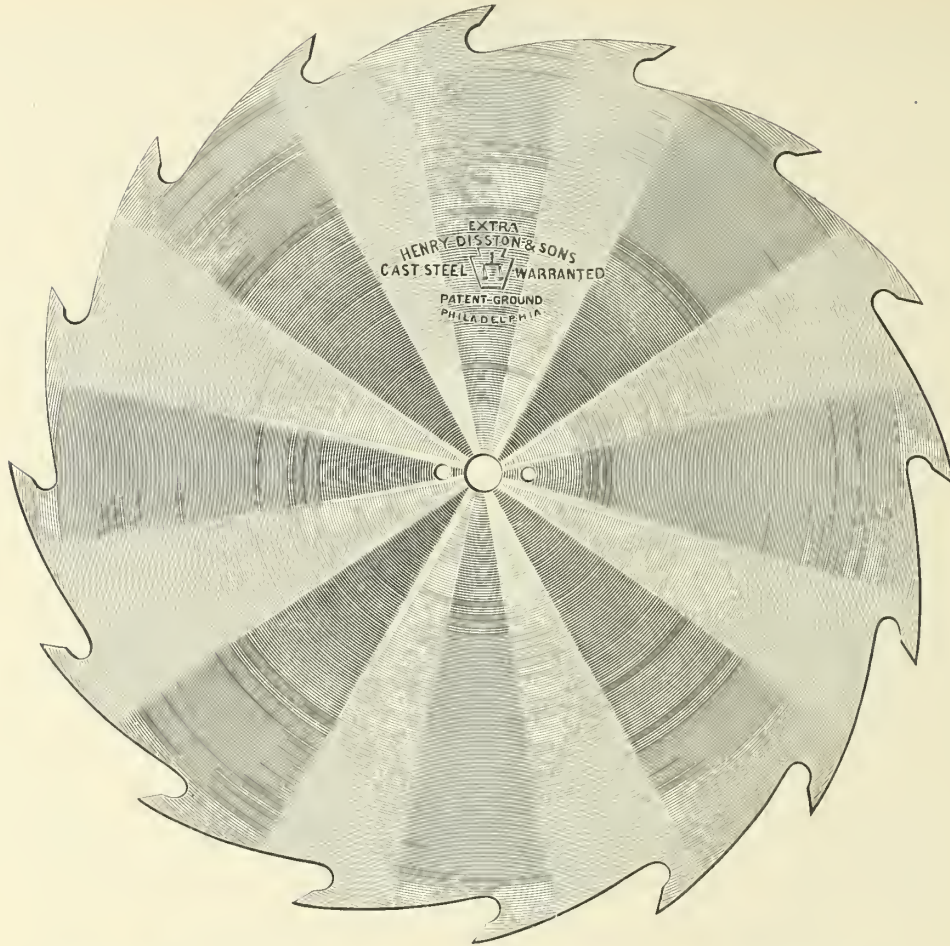


FIG. 1190.



CIRCULAR MITRE SAWS.

FIG. 1191.



CIRCULAR MITRE SAW WITH CLEANER TEETH.

These saws are ground to run without set; especially adapted for smooth cutting, such as cabinet and cigar box work. When ordering, give size of centre hole, also diameter of collars on mandrel.

This saw can be made for either ripping or cross cutting. When used for ripping we put in a greater number of cleaner teeth than when used for cross cutting. It will cut equally as smooth in either ripping or cross cutting.

PATENT GROUND AND TEMPERED SOLID TOOTH CIRCULAR SAWS.

OF EXTRA QUALITY.

Diameter, Inches.	Thickness, Gauge.	Size of Hole, Inch.	Price Each.	Extra for Each Additional Gauge. (Heavier.)	Price for Beveling New Saws (Grinding or Beveling Old Saws Extra.)	Extra for Setting and Sharpening if Rip Saw.	Extra for Setting and Sharpening if Cross Cut Saw.
1	24	3-8	\$ 50	\$ 01	\$ 06 per gauge.	\$ 15	\$ 20
1 1/2	24	3-8	55	01	07 "	17	23
2	23	3-8	60	01 1/2	08 "	18	25
2 1/2	22	3-8	65	02	09 "	20	28
3	21	1-2	70	02 1/2	10 "	21	30
3 1/2	20	1-2	80	03	12 "	23	32
4	19	3-4	1 00	03	14 "	25	35
5	19	3-4	1 20	04	16 "	28	40
6	18	3-4	1 40	05	18 "	30	45
7	18	3-4	1 70	06	20 "	33	50
8	18	7-8	2 00	08	22 "	35	55
9	17	7-8	2 50	10	25 "	40	60
10	16	1	3 00	12	28 "	45	65
11	16	1	3 50	14	30 "	48	70
12	15	1	3 75	17	35 "	50	75
14	15	11-8	4 50	21	40 "	60	85
16	14	11-8	5 50	25	50 "	65	95
18	13	11-4	7 00	30	60 "	70	1 05
20	13	1 1/8	8 50	35	70 "	80	1 15
22	12	1 1/8	10 00	45	80 "	90	1 30
24	11	13-8	12 00	55	90 "	1 00	1 45
26	11	13-8	14 00	65	1 05 "	1 10	1 60
28	10	11-2	16 00	80	1 20 "	1 20	1 75
30	10	11-2	18 00	90	1 30 "	1 30	1 95
32	10	15-8	20 00	1 00	1 40 "	1 40	2 05
34	9	15-8	22 50	1 20	1 55 "	1 60	2 35
36	9	15-8	25 50	1 40	1 70 "	1 70	2 55
38	9	15-8	30 00	1 75	1 85 "	1 85	2 75
40	9	2	35 00	2 00	2 00 "	2 00	2 95
42	8	2	42 00	2 50	2 20 "	.	3 15
44	8	2	50 00	3 00	2 40 "	.	3 35
46	8	2	60 00	3 50	2 60 "	.	3 60
48	8	2	70 00	4 00	2 80 "	.	3 80
50	7	2	80 00	4 50	3 00 "	.	4 10
52	7	2	90 00	5 00	3 25 "	.	4 40
54	7	2	100 00	6 00	3 50 "	.	4 70
56	7	2	115 00	7 00	3 75 "	.	5 00
58	7	2	130 00	8 00	4 05 "	.	5 30
60	6	2	145 00	9 00	4 35 "	.	5 60
62	6	2	160 00	10 00	4 65 "	.	6 00
64	6	2	180 00	12 00	5 00 "	.	6 30
66	6	2	200 00	15 00	5 35 "	.	6 60
68	5	2	225 00	18 00	5 75 "	.	6 90
70	5	2	255 00	21 00	6 15 "	.	7 20
72	5	2	290 00	24 00	6 55 "	.	7 50
74	5	2	330 00	27 00	7 00 "	.	7 75
76	5	2	375 00	30 00	7 50 "	.	8 00

Circular saws for bone or ivory add 50 per cent. to above list.

No extra charge for saws one gauge thicker than list.

Circular saws beveled one gauge without extra charge up to 44 inches. 44 inches and larger beveled two gauges without extra charge.

Circular saws 48 inches and larger, if made thinner than 10 gauge are not warranted, and add 10 per cent. for each gauge thinner than No. 10.

Size Inches.	Gauge at hole.	Gauge at teeth.	Extra for each gauge heavier than list.	Extra for each additional gauge beveling.	Price each.
4	21	18	\$0 05	\$0 14	\$2 50
5	20	17	06	16	3 00
6	20	17	08	18	3 50
7	19	16	09	20	4 25
8	19	16	12	22	4 75
9	18	15	15	25	5 50
10	18	15	18	28	6 00
11	17	14	21	30	6 50
12	17	14	25	35	7 00
14	16	13	32	40	7 75
16	16	13	38	50	8 75
18	15	12	45	60	10 25
20	15	12	53	70	12 25
22	14	11	68	80	15 00
24	14	11	83	90	18 00

CIRCULAR SAWS AND DISCS FOR CUTTING HOT OR COLD IRON.

Saws are toothed ; in ordering, give distance from point to point of tooth ; discs are plain plates without teeth. Note this in ordering.

Inches.	Gauge.	Each.	Inches.	Gauge.	Each.
14	10	\$4 00	34	5	\$18 50
16	10	5 00	36	5	20 50
18	8	6 50	38	4	24 00
20	8	7 50	40	3	29 50
22	7	9 00	42	3	35 00
24	7	10 50	44	3	41 00
26	7	12 00	46	3	50 00
28	6	13 50	48	3	60 00
30	6	15 50	50	3	70 00
32	6	17 00			

FIG. 1192.

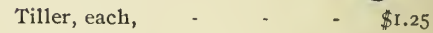
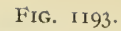
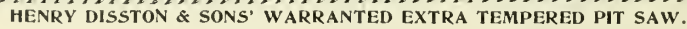
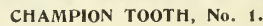
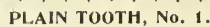
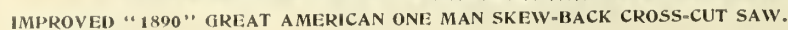
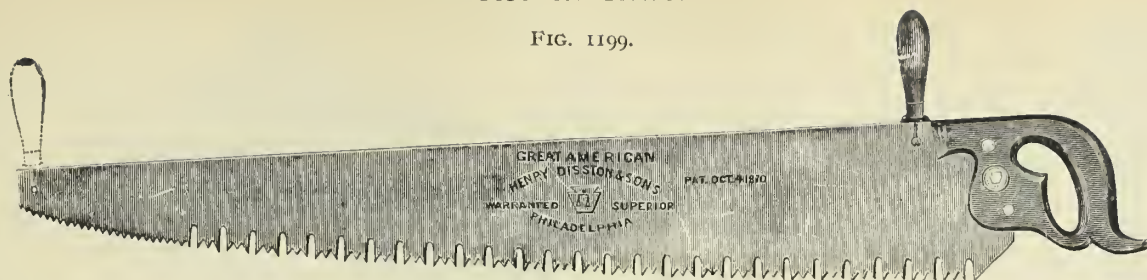


FIG. 1194.

FIG. 1195.FIG. 1196.FIG. 1197.FIG. 1198.726

DISSTON SAWS.

FIG. 1199.

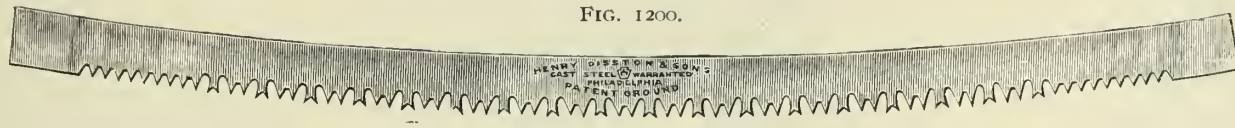


ONE MAN CROSS-CUT SAW.

GREAT AMERICAN SUPPLEMENTARY HANDLE.

3 feet. \$2 55	3½ feet. 2 75	4 feet. 3 25	4½ feet. 3 65	5 feet. 4 10	5½ feet. 4 55	6 feet. 5 00 each
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FIG. 1200.



TRIUMPH NARROW CROSS-CUT.

WITHOUT HANDLES.

	4 feet.	4½ feet.	5 feet.	5½ feet.	6 feet.	6½ feet.	7 feet.	7½ feet.	8 feet.
Champion tooth, - - - - -	\$1 44	1 62	1 80	1 98	2 16	2 34	2 52	2 70	2 88 each
Diamond or Great American tooth, - - - - -	1 52	1 71	1 90	2 09	2 28	2 47	2 66	2 85	3 04 each

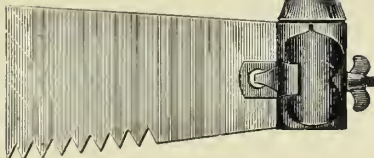
All cross-cut saws over 8 feet in length, add 10 cents per foot, for each foot or fraction of a foot, over 8 feet.

PATENT CROSS-CUT HANDLES.

No. 2.
CLIMAX CROSS-CUT
HANDLE.
35c. per pair.

No. 12.
EXTRA HEAVY
CLIMAX HANDLE.
For Pacific Coast
trade.
50c. per pair.

FIG. 1201.



No. 3.

FIG. 1202.



LOOP HANDLE.
30 cents per pair.

No. 13.
EXTRA HEAVY LOOP HANDLE.
For Pacific Coast trade.
60 cents per pair.

No. 5.
PATENT HANDLE.
50 cents per pair.

FIG. 1204.



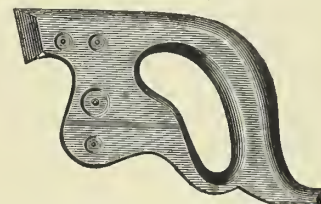
CROSS-CUT TABS.
10 cents per pair.

FIG. 1205.



SUPPLEMENTARY HANDLES FOR
ONE MAN SAW.
Price \$2.00 per dozen.

FIG. 1203.



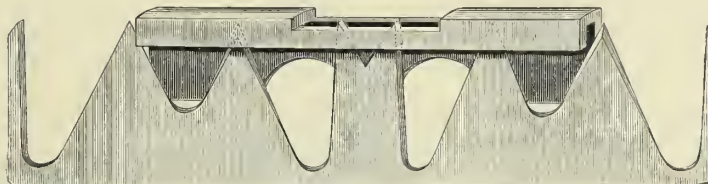
ONE MAN CROSS-CUT HANDLE.
\$3.75 per dozen.

FIG. 1206.



No. 4.
CROSS-CUT SAW HANDLE, PLAIN.
12 cents per pair.

FIG. 1207.



Showing the gauge in position for filing the cleaner-tooth.

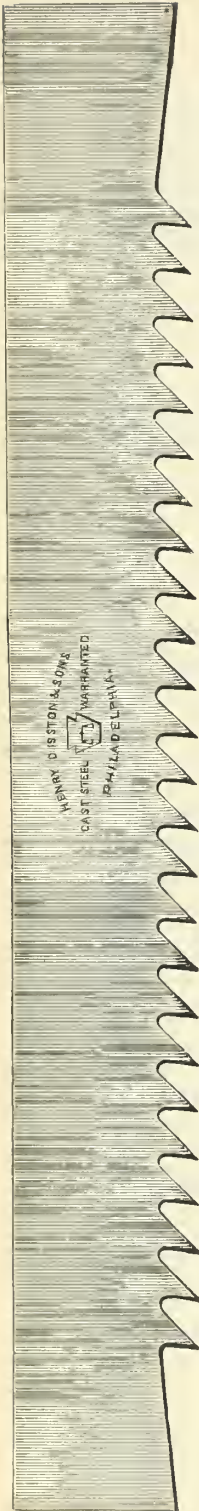
GAUGE FOR REGULATING CLEANING-TEETH.

Price, \$1.00 per dozen.

The cleaning teeth of all saws should be somewhat shorter than the cutting teeth, and although shortened, should be of uniform length throughout.

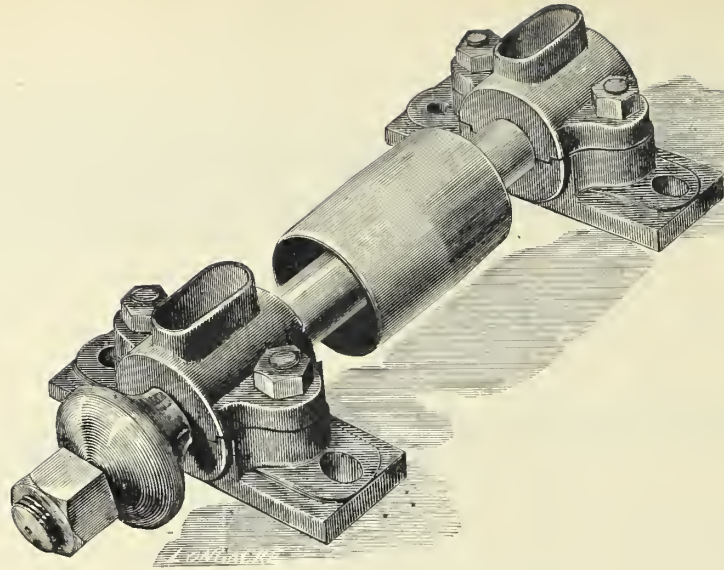
The inner edge of the gauge rests on the points of the cutting teeth, the cleaner-tooth projecting through the opening in the center of gauge. File the projecting point until arrested by the edge of the gauge, which is made of hardened steel. Thus tooth after tooth can be rapidly and correctly reduced to an even length by any unskilled operator.

FIG. 1208.



MILL SAW.

FIG. 1209.



CIRCULAR SAW MANDRELS.

No.		Diameter of Pulley.	Face of Pulley.	Diameter of Flange.	Length of Shaft.	Diameter of Shaft.	Size of Hole in Saw.	Price, Each.
1	-	2 1/2 inches.	3 1/2 inches.	2 1/2 inches.	14 inches.	1 1-16 inches.	1 inch.	\$7 00
2	-	3	4	3	16	1 3-16	1 1-8	8 00
3	-	3 1/2	4 1/2	3 1/2	18	1 5-16	1 1-4	8 50
4	-	4	5	4	20	1 7-16	1 5-16	9 75
5	-	4 1/2	5 1/2	4 1/2	22	1 7-16	1 5-16	11 00
6	-	5	6	5	24	1 7-16	1 3-8	12 50
7	-	5 1/2	6 1/2	5 1/2	26	1 7-16	1 3-8	13 75
8	-	6	7	6	28	1 9-16	1 1-2	15 50
9	-	7	8	6	32	1 11-16	1 5-8	21 50
10	-	8	8	6	36	1 13-16	1 5-8	25 75

CIRCULAR SAW MANDRELS, WITH PULLEY ON END.

No.		Diameter of Pulley.	Face of Pulley.	Diameter of Flange.	Length of Shaft.	Diameter of Shaft.	Size of Hole in Saw.	Price, Each.
1	-	2 1/2 inches.	3 1/2 inches.	2 1/2 inches.	16 1/2 inches.	1 1-16 inches.	1 inch.	\$7 70
2	-	3	4	3	19	1 3-16	1 1-8	8 50
3	-	3 1/2	4 1/2	3 1/2	21 1/2	1 5-16	1 1-4	9 00
4	-	4	5	4	24	1 7-16	1 5-16	10 75
5	-	4 1/2	5 1/2	4 1/2	26	1 7-16	1 5-16	12 00
6	-	5	6	5	28	1 7-16	1 3-8	13 75
7	-	5 1/2	6 1/2	5 1/2	30 1/2	1 7-16	1 3-8	15 00
8	-	6	7	6	32 1/2	1 9-16	1 1-2	19 50
9	-	7	8	6	37	1 11-16	1 5-8	23 50
10	-	8	8	6	41	1 13-16	1 5-8	28 00

Larger sizes made to order.

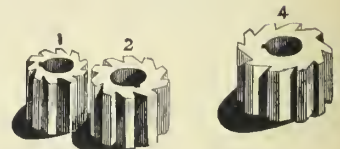
Cutters for No. 2 Gummer have a 5-16 inch hole.
Cutters for No. 1 Gummer have a 9-16 inch hole.

1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2 inch.
\$0 40	.50	.60	.65	.65	.80	.90	1.05	1.20 each.

The 1 inch to 1 1/2 inch Cutters are for the No. 1 Gummer, and the 1/2 to 7/8 inch for the No. 2 Gummer.

Special Cutters made to order.

FIG. 1210.



GUMMER CUTTERS.

MILL SAW.

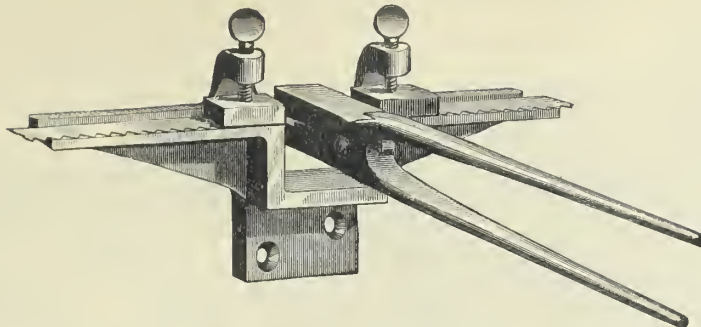
No. 5 gauge Mill Saw, per foot, 8 inches wide,	\$2 20
" 6 " " " " " " " " " " " "	2 10
" 7 " " " " " " " " " " " "	1 90

No. 8 gauge Mill Saw, per foot, 8 inches wide,	\$1 75
" 9 " " " " " " " " " " " "	1 65
" 10 " " " " " " " " " " " "	1 55

When ordering give length, width and thickness or gauge of saw, also space from point to point of teeth and distance from end of saw to point of first tooth.

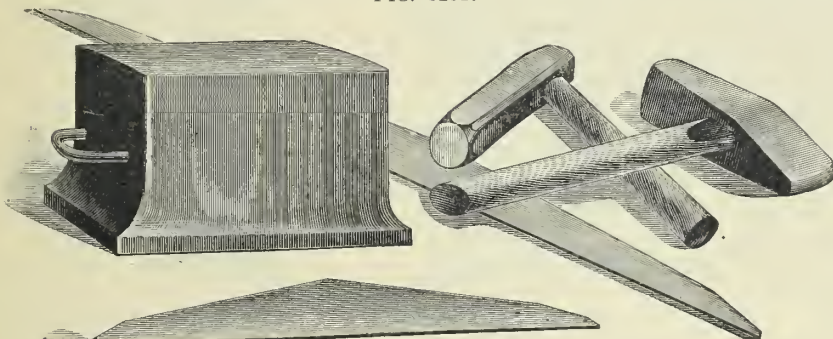
TOOLS FOR REPAIRING SAWS.

FIG. 1211.



Brazing Clamps for small band saws, - each, \$1 35 Brazing Tongs, - - - each, \$1 00

FIG. 1212.

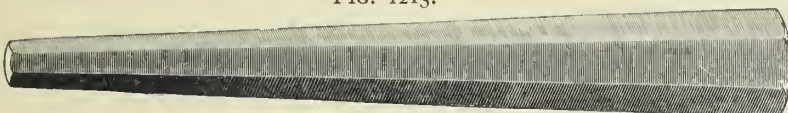


SAW MAKERS' HAMMERS.

FIG. 1213.

SAW MAKERS HAMMERS.

2½ to 3 pounds,	-	-	-	each, \$1 60
3½ to 4 pounds,	-	-	-	" 2 00
4½ to 6 pounds,	-	-	-	" 3 20

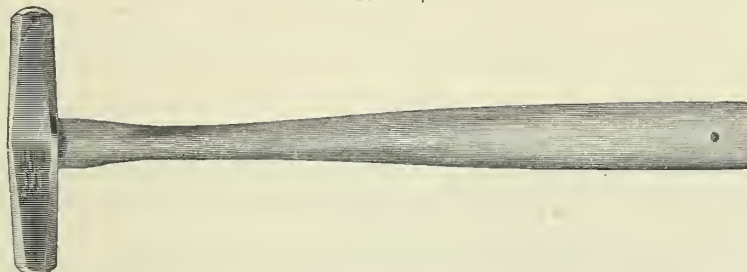


SWAGE BARS.

SWAGE BARS, EITHER 8 OR 6 SIDED.

Length.	Diameter, Large End.	Diameter, Small End.	Each.
14 inches.	2 inches.	1 inch.	\$6 50
12 "	1¾ "	¾ "	4 50
10 "	1½ "	½ "	3 00

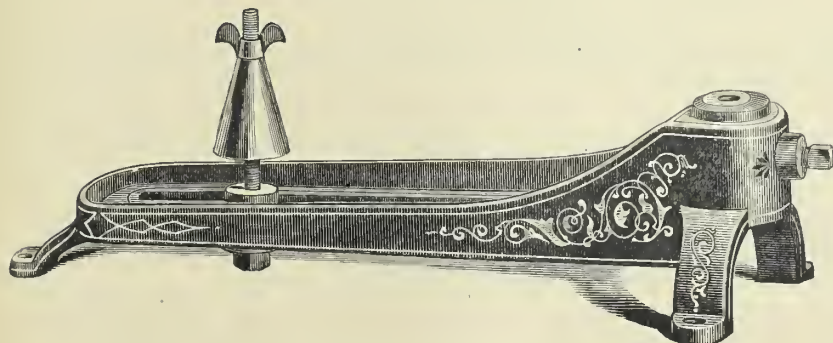
FIG. 1214.



SWAGE BAR HAMMER.

Swage Bar Hammers, - - - each, \$1 00

FIG. 1215.



IMPROVED ADJUSTABLE SETTING STAKE FOR CIRCULAR SAWS.

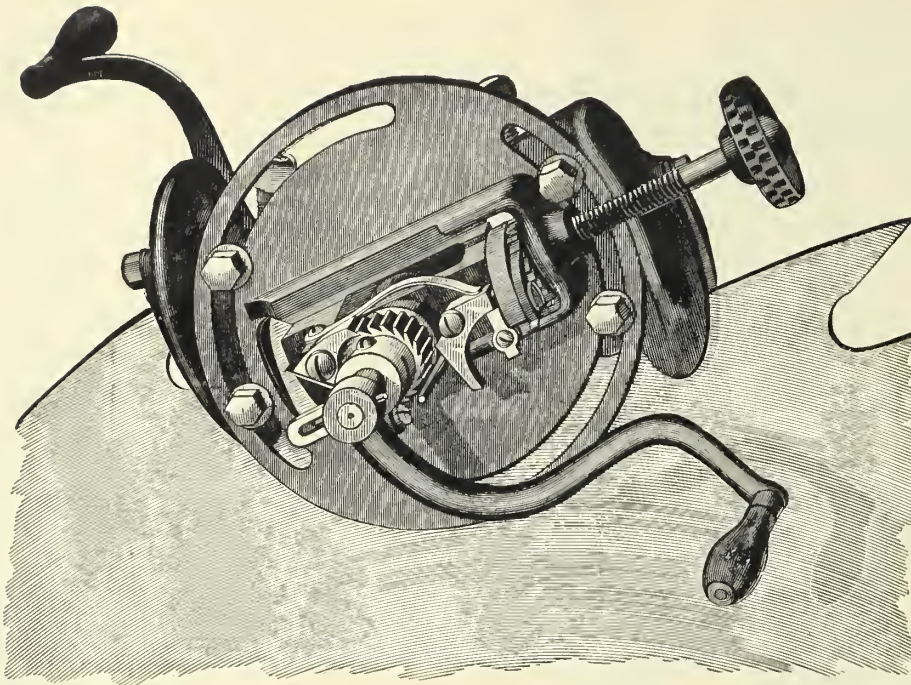
IMPROVED ADJUSTABLE SETTING STAKE FOR CIRCULAR SAWS.

Price, - - - each, \$6 00

This valuable tool can be adjusted to set any saw from 6 to 30 inches in diameter. The cone *A* is moved in or out to suit the diameter of the saw, and raised or lowered, as may be required. The movable anvil at *B* is made of hardened steel, and some portions of the face being beveled more than others, the operator can regulate the amount of set as desired.

Any size or pattern of Swage Bars or Anvils of other dimensions than above can be furnished at special prices.

FIG. 1216.



THE VICTOR SELF-FEEDING SAW GUMMER.

(Patented May 27, 1890.)

Complete with one cutter shaft, cutter grinder and three cutters.

Price, \$18.00 each.

We make three sizes of cutter shafts for this gummer. The No. 1, or large shaft is the same diameter as is used in our No. 1 gummer, and is suitable for 1, 1 1/8, 1 1/4, 1 3/8, and 1 1/2 inch cutters.

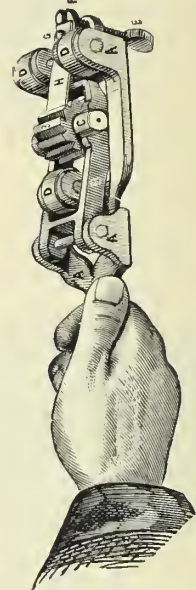
The No. 2 or medium shaft is suitable for cutters 1/2, 5/8, 3/4 and 7/8 inch.

The No. 3 or small shaft is made specially for 3/8 inch cutters.

In ordering gummers state size of cutters wanted.

Extra shafts can be furnished with the gummers at \$2.00 each, so that all above sizes can be used in one machine if so desired.

FIG. 1217.



CUTTER GRINDER.

Cutter Grinder for holding the cutter of chambering machine in position during process of sharpening.

No. 1,	-	-	each, \$1.25
No. 2,	-	-	" 1.25

FIG. 1218.



No. 2.

FIG. 1219.



No. 3.

THE CONQUEROR SWAGE, JUMPER OR UPSET.

No. 00,	-	-	\$4.00.	No. 0,	-	-	\$3.50.	No. 1, for large circular saws,	-	-	\$3.00;	for band saws,	-	-	\$2.50 each.
No. 2,	for small circular and mill saws,	-	-	\$2.50 each.	No. 3,	for small circular saws,	-	-	-	-	\$2.00				

SAW MAKERS' ANVILS—DISSTON'S PATTERN.

Face, 5 1/2 x 8 inches; height, 6 inches; weight, 70 pounds,	-	-	-	-	-	-	-	-	-	-	each, \$11.50
Face, 5 1/2 x 8 inches; height, 7 1/2 inches; weight, 100 pounds,	-	-	-	-	-	-	-	-	-	-	" 15.00
Face, 6 x 10 inches; height, 8 1/2 inches; weight, 150 pounds,	-	-	-	-	-	-	-	-	-	-	" 20.00

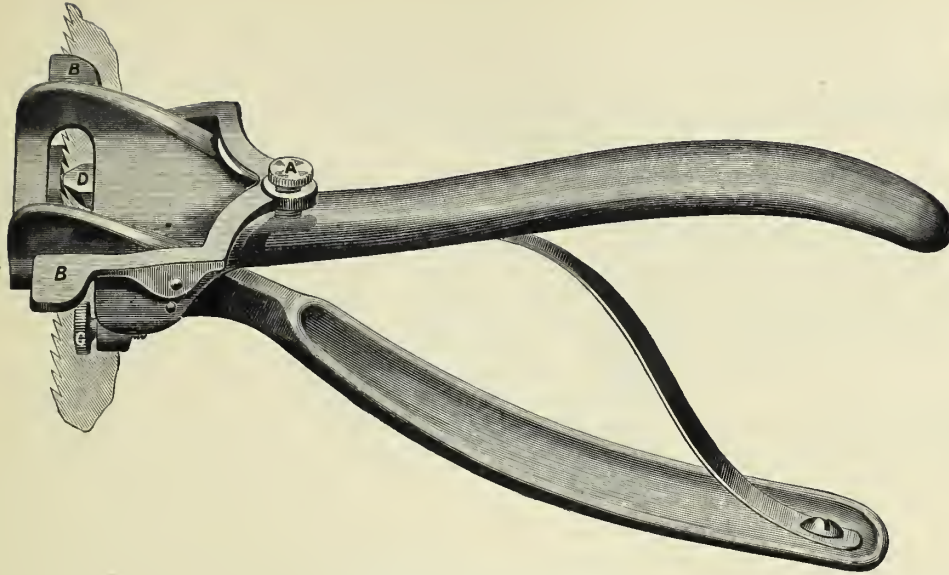
SAW MAKERS' STRAIGHT-EDGES.

12	18	24	30	36	40	44	48	52	54	58	62 inches
\$0.85	1.25	1.75	2.20	2.60	3.00	3.50	4.00	4.65	5.00	5.60	6.50 each

Special sizes to order, special prices.

SAW SETS AND SIDE FILE.

FIG. 1220.

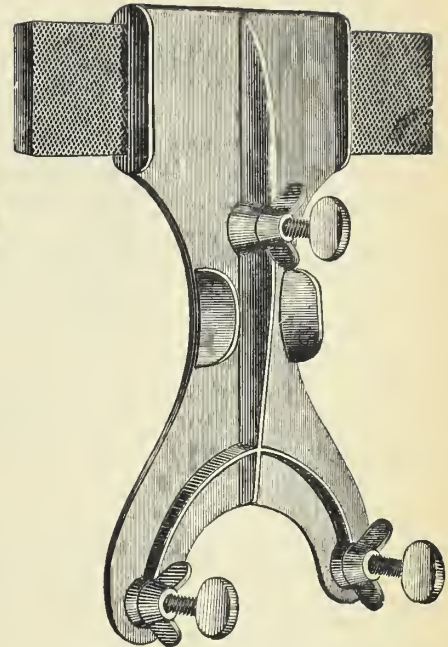


MONARCH PATENT SAW-SET.

Price, Japanned,
Price, Nickel Plated,

per dozen, \$8 00
" 12 00

FIG. 1221.



HENRY DISSTON & SONS' IMPROVED SIDE FILE.

HENRY DISSTON & SONS' IMPROVED SIDE FILE.

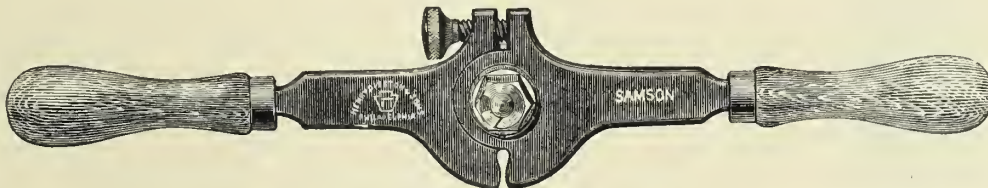
Made in Three Sizes.

- No. 1, or large size, suitable for saws 40 inches diameter and larger.
- " 2, " med. " " " " 38 to 24 inches diameter.
- " 3, " small " " " " 24 inches diameter and smaller.

The side file is used for the purpose of regulating saw teeth after they have been set. It is impossible to set a saw so that some of the teeth will not extend or be bent over a little more than others, and thus make rough lumber. By the use of this tool all the teeth are made even, and a saw thus regulated will run twice as long without sharpening. The file must be so adjusted by means of the set-screw, as to conform to any width of set desired. The jam nuts are for the purpose of securing the set-screws in the desired position.

File for Side File,	each, \$0 40
Frame,	" 75
Complete,	" 1 15

FIG. 1222.



THE SAMSON SAW-SET.

The Most Useful, Powerful and Desirable Made.

Price, No. 1, large size, wooden handle,	each, \$3 50
Price, No. 2, small size, iron handle,	" 1 75

It is made of the best refined cast steel, in two sections, and united in the centre by a bolt, which serves as an axis; thus it can be readily adjusted by means of the set-screw, to suit thickness or gauge of any saw.

FIG. 1223.



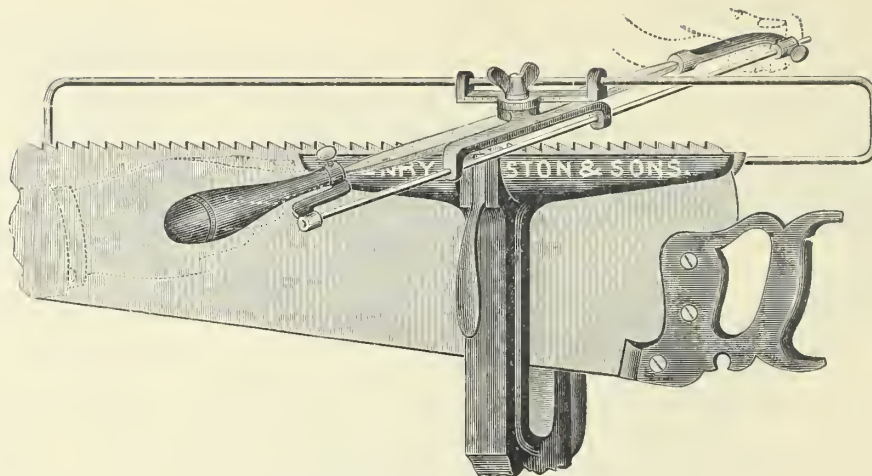
BULLY BOY SAW-SET.

Price,	each, \$3 50
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This is a first-rate saw-set, and can be relied on to give satisfaction.

GUIDES, SAW CLAMPS, ETC.

FIG. 1224.



DISSTON'S 3 D SAW FILING GUIDE.

Especially designed to assist those not skilled in the art of saw filing to file a saw correctly.

This cut shows a saw and the attachment in proper position for filing the first side. There are three marks on one of the hubs of the swivel attachment.

FIG. 1225.

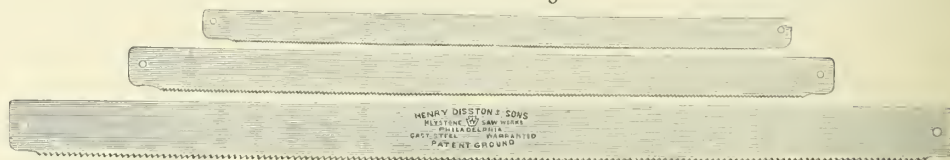
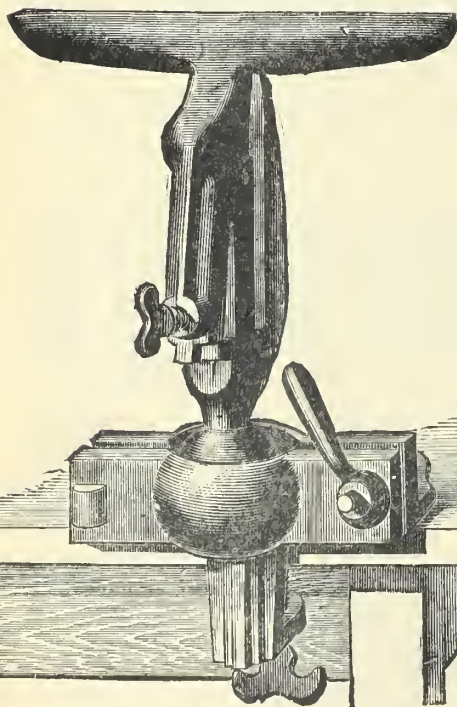


FIG. 1226.



No. 1 ADJUSTABLE BALL AND SOCKET SAW CLAMP.

By the use of this clamp, a saw can be filed at any angle, or square, as the operator may desire.

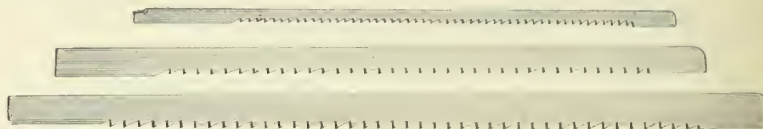
per dozen, \$14 00

GERMAN PATTERN WEBS.

Length.	$\frac{3}{8}$ to $\frac{1}{2}$ wide.	$\frac{7}{8}$ to $1\frac{1}{8}$ wide.	$1\frac{1}{4}$ to $1\frac{1}{2}$ wide.	$1\frac{5}{8}$ to 2 wide.
18 inch.	\$2 15	\$2 20	\$2 25	\$2 30 per doz.
20 "	2 20	2 25	2 30	2 40 "
22 "	2 25	2 30	2 40	2 50 "
24 "	2 40	2 50	2 60	2 70 "
26 "	2 60	2 70	2 80	2 90 "
28 "	2 80	2 95	3 10	3 20 "
30 "	3 00	3 15	3 30	3 40 "
32 "	3 20	3 35	3 50	3 60 "
34 "	3 40	3 50	3 60	3 75 "
36 "	3 50	3 60	3 75	3 90 "

All of above webs are set and sharpened.

FIG. 1227.



FAY'S PATENT SCROLL SAWS.

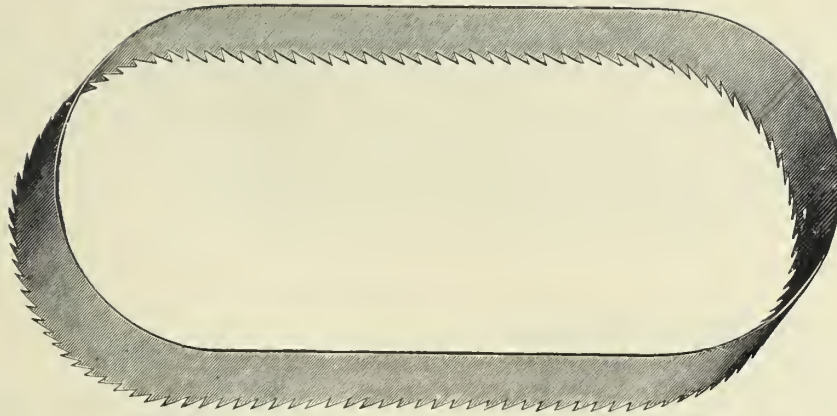
8 inches.	9 inches.	10 inches.	11 inches.	12 inches.	13 inches.
\$1 75	2 00	2 25	2 50	2 75	3 00 per dozen.
14 inches.	16 inches.	18 inches.	20 inches.	22 inches.	24 inches.
\$3 25	3 50	4 00	4 50	5 00	5 50 per dozen.

Webs to 16-inch, over $\frac{3}{4}$ inch wide, extra price. Webs from 18 to 24 inch, over one inch wide, extra price.

We make the above webs from 13 to 16 gauge in thickness.

BAND AND GROOVING SAWS.

FIG. 1228.



BAND SAWS.

All band saws six inches and wider are made from our Special Aluminum Steel, and are hardened and tempered by our special process, which none others possess.

List Prices for Band Saws not Joined, Set or Filed. Net Prices for Joining.

Inches Wide.	Gauge.	Per Foot.	Each.
$\frac{1}{4}$	21	\$0 07	\$0 20
$\frac{3}{8}$	21	08	20
$\frac{1}{2}$	21	10	20
$\frac{5}{8}$	21	12	25
$\frac{3}{4}$	20	14	25
$\frac{7}{8}$	20	16	25
1	20	18	30
$1\frac{1}{8}$	20	20	30
$1\frac{1}{4}$	19	23	30
$1\frac{3}{8}$	19	26	40
$1\frac{1}{2}$	19	28	40
$1\frac{3}{4}$	19	34	75

Setting and filing, 4c. per foot extra.

Band saws for metal, add 50 per cent. to above list.

Prices for Band Saws Set, sharpened and Joined Complete.

Inches Wide.	Gauge.	Per Foot.	Inches Wide.	Gauge.	Per Foot.
2	18	\$0 50	6	16	\$1 80
$2\frac{1}{4}$	18	60	7	16	2 15
$2\frac{1}{2}$	18	65	8	14 to 16	2 50
3	17	80	9	14 to 16	3 00
$3\frac{1}{2}$	17	1 00	10	14 to 16	3 50
4	16	1 20	11	14 to 16	4 20
$4\frac{1}{2}$	16	1 35	12	14 to 16	5 00
5	16	1 50	14	12	7 00
$5\frac{1}{2}$	16	1 65			

When ordering, state whether to be set, sharpened or joined. Toothed blanks are same price as finished saws. Band saw blanks, either bright or black, of any width, furnished to order, but not warranted.

Silver solder, for brazing band saws, kept in stock.

SUGGESTIONS ON THE USE OF BAND SAWS.

Keep the correct pitch upon the tooth, so as to give the saw a proper lead into the cut. This will take the friction entirely off the stay pin. By the use of a round edge file, the saw will be kept from galling and breaking. To save trouble and expense, a proper pitch must be held for each kind of work and wood.

Band saws of any width, length and tooth, set, sharpened and joined, complete.

GROOVING SAW.

FIG. 1229.



Thickness,	$\frac{1}{8}$ inch.	$\frac{3}{16}$ inch.	$\frac{1}{4}$ inch.	$\frac{5}{16}$ inch.	$\frac{3}{8}$ inch.	$\frac{7}{16}$ inch.	$\frac{1}{2}$ inch.
Diam., 4 inches,	\$1 20	1 40	1 60	2 50	3 50	4 50	5 50
" 5 "	1 55	1 75	2 10	3 00	4 00	5 00	6 00
" 6 "	1 90	2 20	2 70	3 50	4 50	5 50	6 50
" 7 "	2 30	2 70	3 30	4 00	5 00	6 00	7 00
" 8 "	2 70	3 20	3 90	4 75	5 75	6 75	7 75
" 9 "	3 30	3 75	4 50	5 25	6 25	7 25	8 25
" 10 "	3 90	4 50	5 10	6 00	7 00	8 00	9 00
" 11 "	4 50	5 10	5 70	6 50	7 50	8 50	9 50
" 12 "	5 10	5 70	6 25	7 50	8 50	9 50	10 50
" 14 "	6 00	7 00	8 00	9 00	10 50	12 00	13 50
" 16 "	7 00	8 00	9 00	10 00	12 00	14 00	16 00
Space of teeth,	$\frac{1}{2}$ inch.	1 inch.	1 inch.	$1\frac{1}{4}$ inches.	$1\frac{1}{2}$ inches.	$1\frac{3}{4}$ inches.	2 inches.

Saws with less space or special teeth, extra price.

HAND, PANEL AND RIP SAWS.

FIG. 1230.



Disston & Sons' extra refined London spring steel, patent ground and tempered, selected and highly polished blade, handle carved and polished, 4 improved brass screws, the finest hand saw manufactured.

RIP SAW. No. 12.

16	18	20	22	24	26	28	30 inches.
\$20 00	22 00	24 00	26 00	28 00	30 00	34 00	39 00 per dozen.

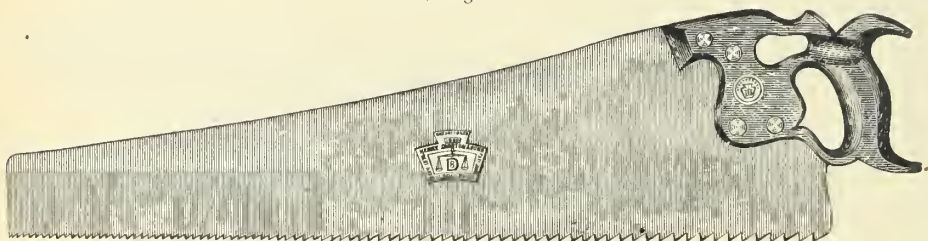
FIG. 1231.



RIP SAW. No. 9.

16	18	20	22	24	26	28	30 inches.
\$15 50	17 00	19 00	21 00	23 00	24 00	28 00	32 00 per dozen.

FIG. 1232.



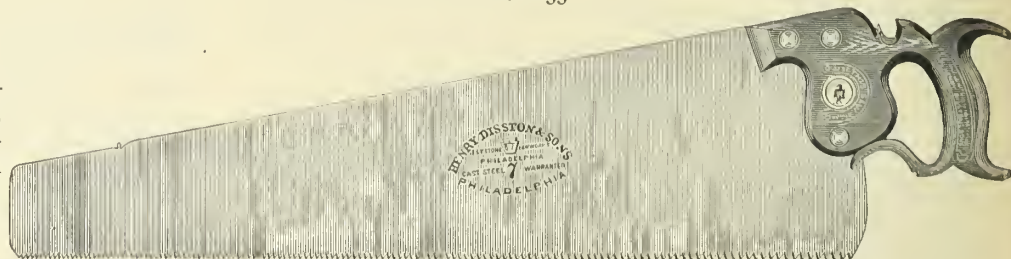
Disston & Sons' warranted spring steel, patent ground and tempered skew-back saw, apple handle, polished edge, 5 improved screws. Rip saws with graduated teeth.

RIP.

16	18	20	22	24	26	28	30 inches.
\$14 50	16 00	17 50	19 50	21 00	22 00	25 00	28 00 per dozen.

These saws have all the latest improvements in hand saws, and are warranted superior to all others. They combine the popular skew back, the peculiar shaped butt or heel, which, with the new screws, makes it almost impossible to work loose from the handle, and gives the full sweep of the saw without the possibility of catching in the work. All of the above features are patented.

FIG. 1233.

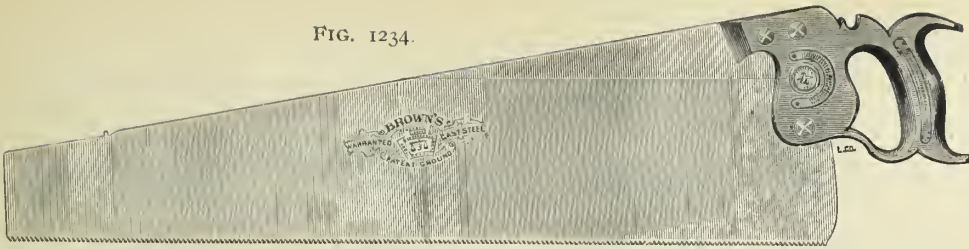


RIP. No. 7.

14	16	18	20	22	24	26	28	30	32	34	36 inches.
\$12 00	13 00	14 00	16 00	18 00	19 00	20 00	23 50	27 00	30 50	34 50	39 00 per dozen.

DISSTON SAWS.

FIG. 1234.



**BROWN WARRANTED CAST STEEL, PATENT, GROUND AND
TEMPERED, HAND, PANEL AND RIP SAWS.**

No. 3. Brown, beech handle, polished edge, 4 rivets, grained blade, etched.

14	16	18	20	22	24	26	28	30	inches
\$7.00	8.00	9.00	10.00	11.00	12.00	13.00	16.00	19.00	per dozen

FIG. 1235.



HENRY DISSTON & SONS' CAST STEEL BACK SAWS.

No. 4. Disston & Sons' apple handle, polished edge, blued back.

8 inches	10 inches	12 inches	14 inches	16 inches	18 inches
\$13.00	14.00	16.00	18.00	20.00	22.00 per dozen

No. 5. Disston & Sons' same quality as No. 4, with brass back.

8 inches	10 inches	12 inches	14 inches	16 inches	18 inches
\$18.00	19.00	21.00	23.00	26.00	30.00 per dozen

No. 7. Disston & Sons' same quality as No. 4, with polished steel back.

8 inches	10 inches	12 inches	14 inches	16 inches	18 inches
\$14.00	15.00	17.00	19.00	21.00	23.00 per dozen

FIG. 1236.

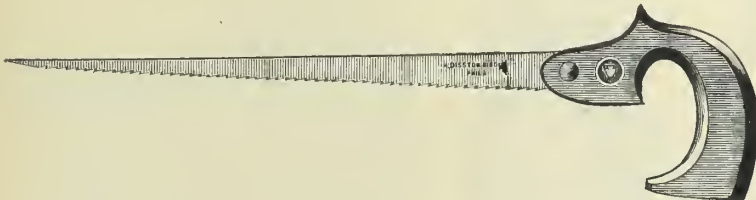
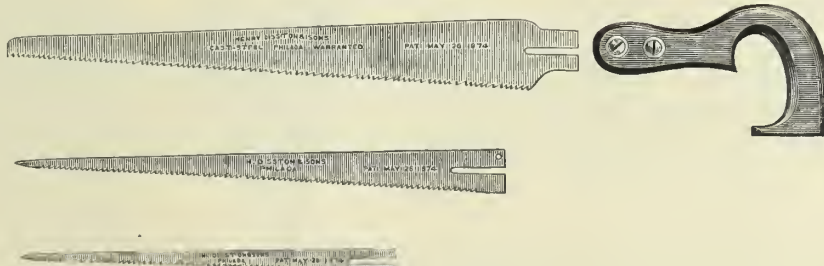


FIG. 1240.



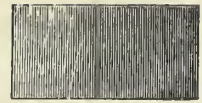
NEST OF SAWS.

Patented May 26, 1874. Combining one each, keyhole, compass and table or pruning saw.

[illegible]

Three sets in a box.

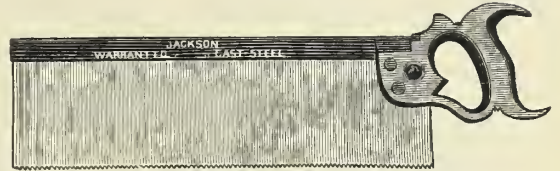
FIG. 1237.



CABINET SCRAPER.

2, 2½ and 3 x any multiple up to 6 inches,	-	6oc. dozen
3½, 4 and 5 x any multiple up to 6 inches,	-	\$1.00 dozen

FIG. 1238.



JACKSON CAST STEEL BACK SAW.

No. 1. Jackson's beech handle, polished edge, blued back.

8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.	
\$9.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00	per doz.

FIG. 1239.



KEYHOLE SAW AND PAD.

Keyhole Saw, \$1.40, handle, 60 cents. \$2.00 complete, per dozen.

This is a cheap and convenient combination of keyhole saw, saw pad and screw driver.

Cast Steel Keyhole Saws extra ground, set and sharpened,	\$2.00
Cast Steel Reversible Keyhole Saws,	2.00
Cast Steel Blind Makers' Saws,	1.75

CAST STEEL COMPASS SAW.

No. 2. Disston apple handle.

10 inches	12 inches	14 inches	16 inches	18 inches
\$4.25	4.50	4.75	5.00	5.25 per dozen

SAW HANDLES AND SCREWS.

HANDLES.

	16-18 inches.	20-22 inches.	24-26 inches.
Hand Saw, No. 0, Beech, - - - - -	-	-	\$1 25 per dozen.
Hand Saw, No. 1, Beech, - - - - -	-	-	1 40 per dozen.
Hand Saw, No. 3, Beech, - - - - -	\$1 30	\$1 50	1 50 per dozen.
Hand Saw, No. 107, Beech, - - - - -	1 75	1 75	2 00 per dozen.
Hand Saw, No. 7, Beech, - - - - -	2 25	2 25	2 50 per dozen.
Hand Saw, No. 8, Apple, - - - - -	3 25	3 25	3 50 per dozen.
Hand Saw, No. D8, Apple, - - - - -	3 75	3 75	4 00 per dozen.
Hand Saw, No. 120, Carved Apple, - - - - -	6 50	6 75	7 00 per dozen.
Hand Saw, No. 12, Carved Apple, - - - - -	6 25	6 50	6 75 per dozen.
Hand Saw No. 16, Carved Apple, - - - - -	5 50	5 75	6 00 per dozen.
		8-10-12 inches.	14-16 inches.
Back Saw, No. 1, Beech, - - - - -	-	\$1 25	\$1 50 per dozen.
Back Saw, No. 4, Apple, - - - - -	-	2 50	2 75 per dozen.
Compass Saw, - - - - -	-	-	1 10 per dozen.

SAW SCREWS.

FIG. 1241.



No. 1.

FIG. 1242.



No. 2.

FIG. 1243.



No. 4.

FIG. 1244.



No. 5.

FIG. 1245.



No. 6.

No. 1. Centennial (Brass Screws), - - - - -	\$2 80 per gross.
No. 2. Centennial (Brass Screws), - - - - -	3 25 per gross.
No. 3. Centennial (Brass Screws), Small Eagle, - - - - -	4 75 per gross.
No. 4. Centennial (Brass Screws), Large Eagle - - - - -	5 75 per gross.
No. 5. Raised (Brass Screws), - - - - -	5 00 per gross.
No. 6. Iron Screws, - - - - -	5 00 per gross.
No. 15. Brass Screws, Round Head, - - - - -	4 75 per gross.

Saw screws in half gross boxes.

THOMPSON'S "PERFECT" PLUMB BOBS.

FIG. 1246



3-5 SIZE No. 9,
SURVEYORS.

FIG. 1247.



3-5 SIZE No. 6,
MECHANICS.

FIG. 1248.

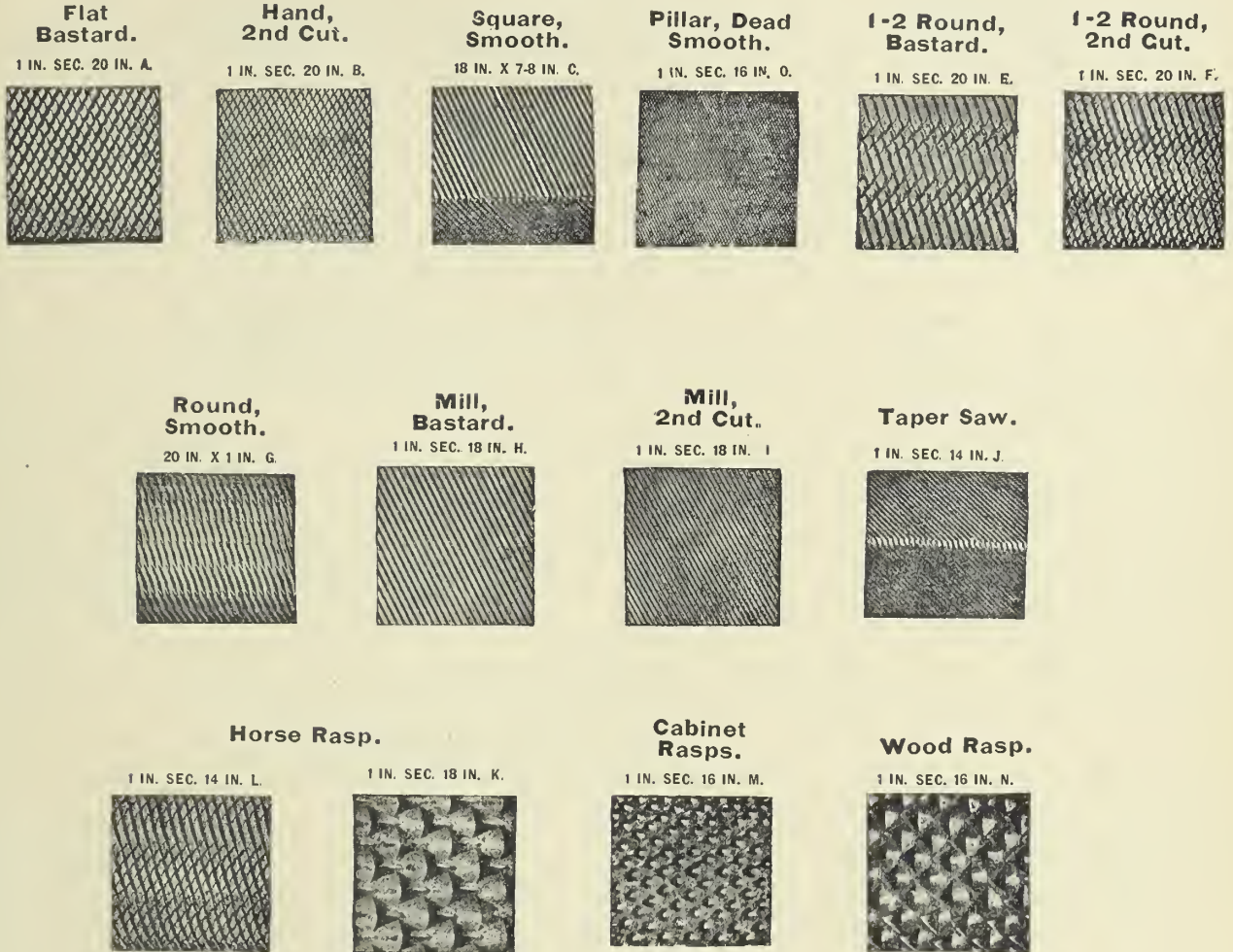


Complete Set of Thompson's Plumb Bobs, one each, Nos. 1 to 10, in handsome case with glass cover, per set, \$19.15.

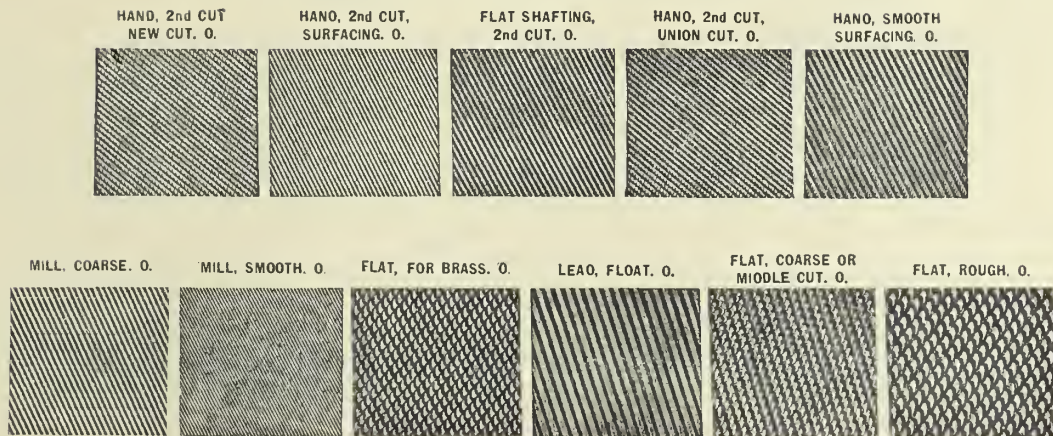
No extra charge for case when full set is ordered.

Showing Cuts of Files and Horse, Wood and Cabinet Rasps.

FIG. 1249.

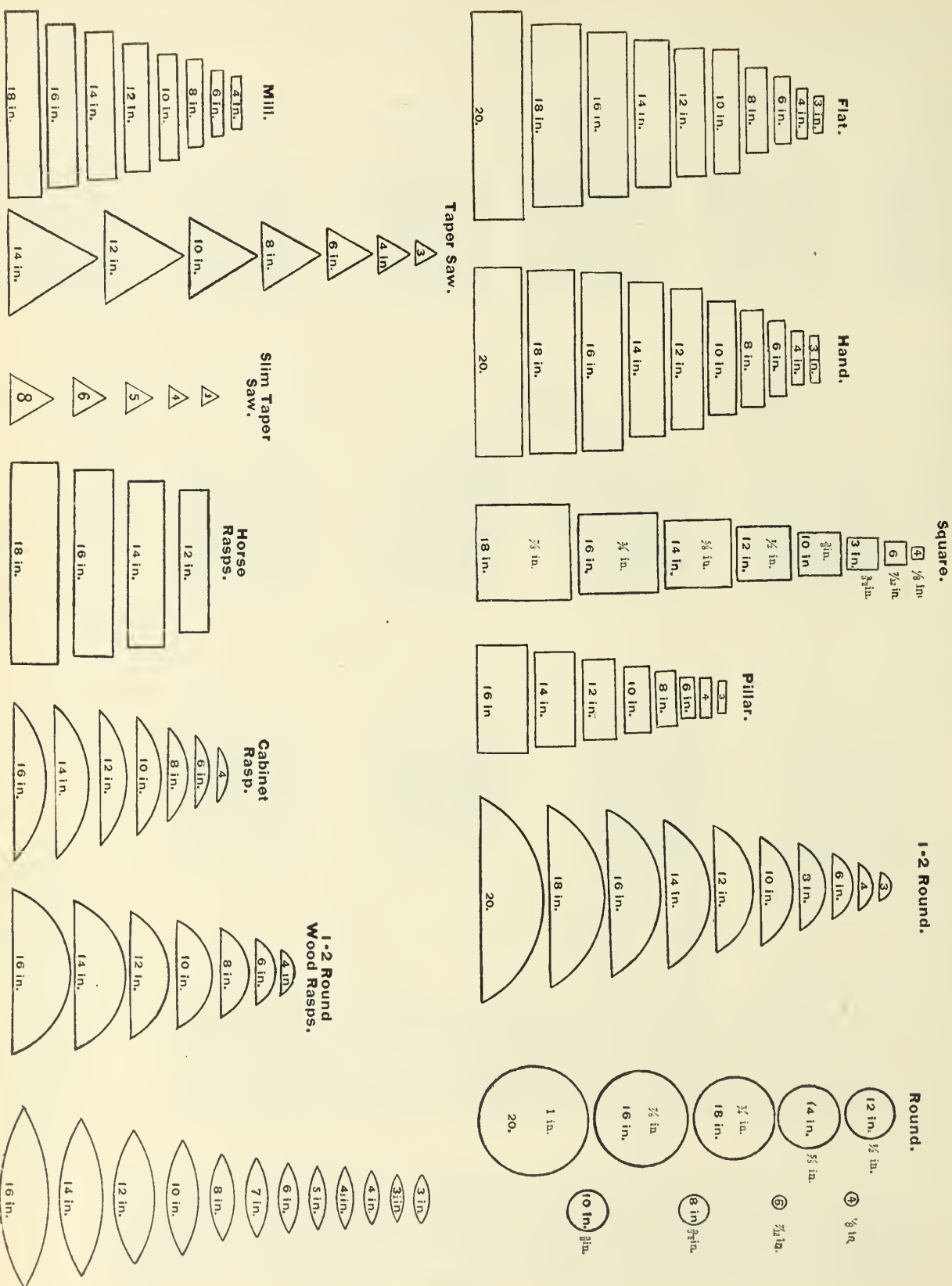


Special Cuts of Files.



CROSS SECTION DIAGRAMS SHOWING DIMENSIONS OF FIBES.

FIG. 1250.



PRICE LIST OF FILES AND RASPS.

Mill and Round.				Flat and Square.				Hand, Warding & Pillar.				Half-round and Three-square.			
Inch.	Bastard.	2d Cut.	Smooth	Inch.	Bastard.	2d cut.	Smooth	Inch.	Bastard.	2d Cut.	Smooth	Inch.	Bastard.	2d Cut.	Smooth
4	\$1 80	\$2 15	\$2 40	4	\$2 00	\$2 40	\$2 65	4	\$2 25	\$2 70	\$3 00	4	\$2 50	\$3 00	\$3 30
5	2 00	2 40	2 65	5	2 20	2 60	2 90	5	2 50	3 00	3 30	5	2 80	3 35	3 70
6	2 25	2 65	2 95	6	2 50	2 95	3 25	6	2 80	3 30	3 65	6	3 20	3 80	4 15
7	2 55	3 00	3 30	7	2 90	3 40	3 75	7	3 20	3 75	4 15	7	3 70	4 35	4 80
8	2 90	3 40	3 70	8	3 40	4 00	4 35	8	3 70	4 35	4 75	8	4 30	5 00	5 50
9	3 30	3 85	4 20	9	4 00	4 70	5 10	9	4 35	5 10	5 55	9	5 00	5 85	6 40
10	3 80	4 40	4 80	10	4 70	5 45	5 90	10	5 20	6 00	6 55	10	5 80	6 75	7 30
11	4 50	5 20	5 65	11	5 60	6 50	7 05	11	6 30	7 30	7 95	11	6 70	7 75	8 45
12	5 40	6 20	6 75	12	6 70	7 70	8 40	12	7 50	8 60	9 40	12	7 80	9 00	9 75
13	6 50	7 45	8 05	13	8 00	9 15	10 00	13	8 90	10 20	11 00	13	9 10	10 40	11 25
14	7 80	8 90	9 65	14	9 50	10 90	11 80	14	10 50	12 00	13 00	14	10 60	12 10	13 10
15	9 30	10 60	11 45	15	11 20	12 75	13 75	15	12 30	14 00	15 10	15	12 40	14 15	15 25
16	11 00	12 50	13 40	16	13 10	14 85	16 00	16	14 30	16 20	17 50	16	14 50	16 50	17 70
17	12 90	14 60	15 60	17	15 25	17 25	18 45	17	16 60	18 75	20 10	17	16 90	19 10	20 50
18	15 10	16 90	18 10	18	17 65	19 75	21 20	18	19 20	21 50	23 00	18	19 60	22 00	23 50
19	17 60	19 70	21 10	19	20 30	22 75	24 35	19	22 10	24 75	26 50	19	22 60	25 30	27 10
20	20 40	22 85	24 50	20	23 20	26 00	27 85	20	25 30	28 35	30 35	20	26 00	29 10	31 20
Extras.				Extras.				Extras.				Extras.			
Mill double cut, advance 1 in.				Cant, blunt, (double cut), advance 2 inches.				Ginsaw (single), take bastard price.				Knife, advance 1 inch.			
Mill narrow points, advance 1 in.								Slotting (blunt), advance 2 in.				Highback, half rd. (blunt) adv. 2 in			
Cross cut blunt, advance 1 in.												Cross (blunt), advance 2 inches.			
												Feather edge (blunt), adv. 2 in.			

Inch,	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	13	14
Tapers, single cut,	1 10	1 10	1 20	1 40	1 70	2 00	2 40	3 00	3 80	4 60	5 70	7 20	9 00	11 00	13 20
Tapers, double cut,	1 60	1 60	1 75	2 00	2 40	2 75	3 25	4 00	4 95	5 90	7 10	8 80	10 80	12 90	15 20
Slim tapers, single cut,	1 20	1 20	1 30	1 45	1 70	1 95	2 10	2 50	3 00	3 70	4 50	5 50	6 80	8 30	10 00
Slim tapers, double cut,	1 80	1 80	1 90	2 10	2 40	2 60	2 85	3 30	3 90	4 70	5 60	6 75	8 20	9 75	11 50
Pitsaw blunt, single cut,	2 10	2 10	2 20	2 30	2 50	2 80	3 20	3 70	4 30	5 00	5 80	6 70	7 70		
Hooktooth blunt, single cut,							3 60	3 90	4 40	5 10	6 00	7 10	8 40		

Extras.

Bandsaw, heavy, blunt, take taper double-cut price. Taper points same price.
 Bandsaw, light, blunt, take slim taper double-cut price. Taper points same price.
 Cautsaw, blunt, single cut, take pitsaw price.
 Round gulleting, blunt, single cut, take pitsaw price.
 Round off, blunt, single cut, take hooktooth price.
 Reversible taper saw, No. 7, \$2.55; No. 8, \$2.80; No. 9, \$3.15; No. 10, \$3.70 per dozen.

Inch,	6	7	8	9	10	11	12	13	14	15	16	17	18
Horse rasps, plain,	-	-	-	-	6 50	7 50	9 00	10 70	12 70	15 00	17 60	20 50	23 70
Horse rasps, beveled and ¾ rasp,	-	-	-	-	7 20	8 30	10 00	11 80	14 00	16 50	19 40	22 50	26 00
Horse rasps, tanged,	-	-	-	-	9 00	10 25	12 00	14 00	16 50	19 50	23 00		
Wood rasps, half round and flat,	4 20	5 00	6 10	7 30	8 75	10 40	12 30	14 50	16 90	19 60	22 50		
Cabinet rasps,	6 00	7 00	8 20	9 60	11 20	13 00	15 00	17 20	19 60	22 20	25 00		
Cabinet files,	4 20	5 00	6 10	7 30	8 75	10 40	12 30	14 50	16 90	19 60	22 50		
Shoe rasps, half round and flat,	4 60	5 30	6 10	7 00	8 00	9 10	10 30	11 60	13 00				
Shoe rasps, oval,	5 30	6 10	7 00	8 00	9 10	10 30	11 60						

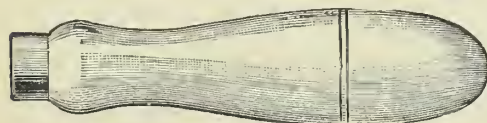
Extras.

File rasps, flat and half round, take flat and half round wood rasp price.
 Wood files, flat and half round, take flat and half round bastard rasp price.
 Last makers' rasps, one inch advance on cabinet.

EXTRAS, (GENERAL.)

One round edge, advance 7½ per cent.; and two round edges, 15 per cent. on respective kinds and cuts.
 Blunt files not specified, advance one inch on respective kinds and cuts. Dead smooth, double the price of bastard cut.
 Equalings, (bellied), advance two inches on respective kinds and cuts.
 Sizes below 4 inches, not extended, take 4 inch price; 1-2 inches, not specified, take next higher full inch price.
 Rough, coarse, union cut brass, or other than regular cuts (not specified), made upon regular or standard shaped blanks, advance one inch on respective kinds and cuts.
 Single or float cut (not specified), on regular shapes, take double cut price.
 IRREGULAR GOODS.—All lengths above those listed, and files varying from standard sizes, to be classed as irregular and subject to special prices.

FIG. 1251.



FILE HANDLES.

No. 121½. Brass ferrules, assorted, 4 sizes - - - - per gross, \$4 00
 No. 123½. Brass ferrules, assorted, 2 larger sizes only, - - - - " 4 75

Boxes of three dozen.

LOCK JAW FILE HANDLES.

No. 125. Assorted sizes, - - - - per gross, \$5 00
 Do not split. Do not rust. Boxes of one dozen.

SHOVELS, SCOOPS AND SPADES.

FIG. 1252.



LONG HANDLE, BACK STRAP, SQUARE POINT SHOVEL.

FIG. 1253.



PATENT LONG HANDLE, PLAIN BACK, SOLID CAST STEEL, ROUND POINT SHOVEL.

FIG. 1254.



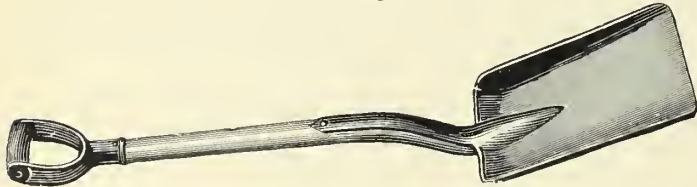
SOCKET STRAP, BACK STRAP, CAST STEEL, D HANDLE.

FIG. 1256.



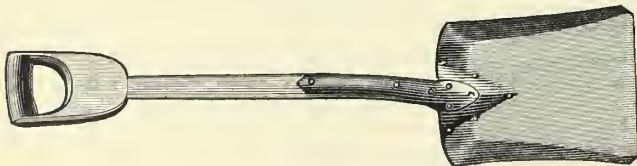
SOLID CAST STEEL, SOCKET STRAP, RAILROAD SHOVEL NO. 2.

FIG. 1258.



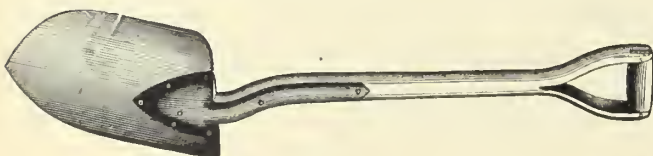
BROAD STRAP TAMPING SHOVEL.

FIG. 1260.



PATENT PLAIN BACK SHOVEL.

FIG. 1262.



BACK STRAP, PATENT HANDLE, ROUND POINT SHOVEL.

FIG. 1255.



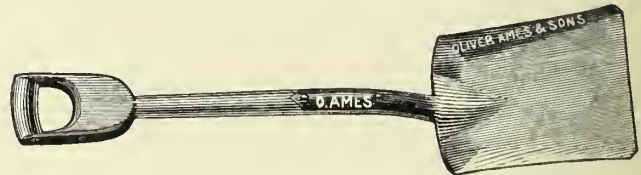
SOCKET STRAP, BACK STRAP, CAST STEEL, D HANDLE.

FIG. 1257.



SOCKET STRAP TAMPING SHOVEL.

FIG. 1259.



D HANDLE, CAST STEEL, BACK STRAP SHOVEL.

FIG. 1261.



PATENT D HANDLE, SOLID CAST STEEL PLAIN BACK SHOVEL NO. O.

FIG. 1263.



CAST STEEL POLISHED SCOOP.

SHOVELS, SCOOPS AND SPADES.—Continued.

FIG. 1264.



No. 8 Scoop.

FIG. 1265.



D Handle, Plain Back, Round Point Shovel.

FIG. 1266.



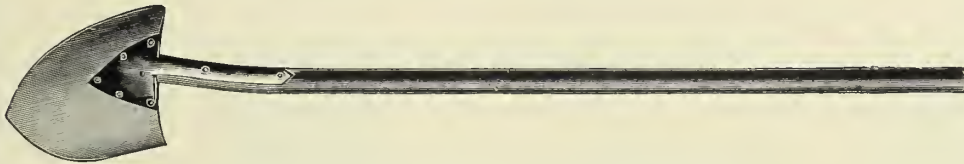
Broad Strap.

FIG. 1267.



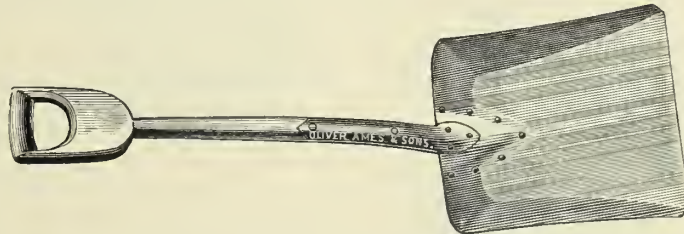
Long Handle, Plain Back, Square Point Shovel.

FIG. 1268.



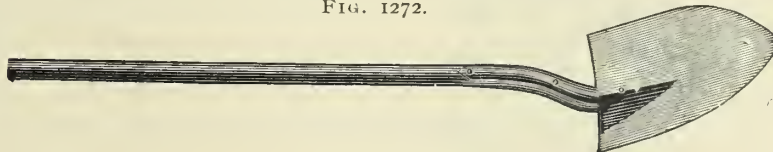
Long Handle, Back Strap, Round Point Shovel.

FIG. 1271.



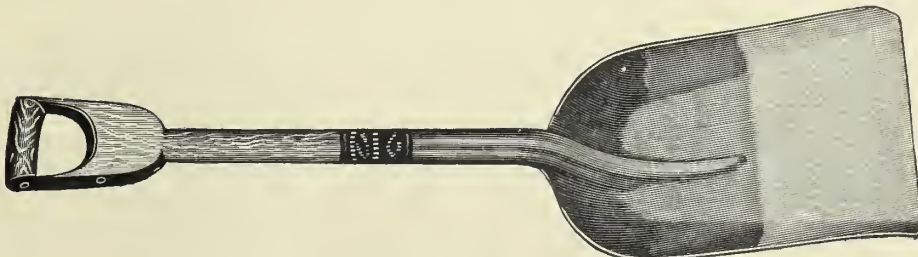
Western Pattern Coal Shovel No. 2. Size 14 $\frac{3}{4}$ x 13 $\frac{1}{4}$ x 14 $\frac{1}{2}$ inches.

FIG. 1272.



Broad Strap.

FIG. 1273.



No. 96.

FIG. 1270.



Long Handle, Plain Back, Round Point Shovel.

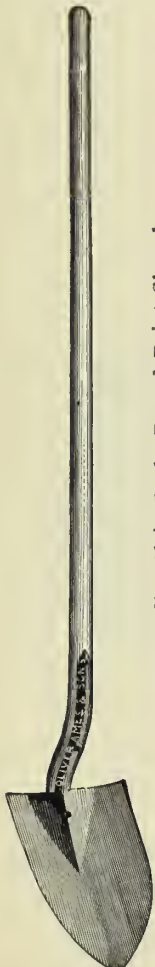


FIG. 1274.



No. 690.—Patent Long Handle, Plain Back, Solid Cast Steel Spade.

FIG. 1275.



FIG. 1277.



FIG. 1276.



FIG. 1278.



FIG. 1279.



SHOVELS, SCOOPS AND SPADES.—Continued.

FIG. 1280.



Polished, D Handle Ditching Spade.

Tapers from 6½ inches at point to 5¼ inches at shoulder.

	14	16	18	20	22 inches long
Steel Edge, - - - - -	\$12 75	13 25	13 75	14 25	14 50 per dozen
Steel Edge, - - - - -	10 00	10 50	11 00	11 50	12 00 per dozen
Patent Solid Cast Steel, - - - - -	13 25	13 75	14 25	14 75	15 00 per dozen
Patent Solid Cast Steel, - - - - -	10 25	10 75	11 25	11 75	12 25 per dozen
Patent Solid Steel, - - - - -	8 25	8 50	9 00	9 50	9 75 per dozen

Ditching Spades with T handles, 25 cents extra.

FIG. 1281.



Polished Post Spade.

Tapers from 6 inches at point to 5½ inches at shoulder.

	14	16	18	20	22 inches long
Cast Steel Edge, - - - - -	\$12 00	12 25	12 75	13 25	14 00 per dozen
Cast Steel Edge, - - - - -	10 00	10 25	10 75	11 25	11 75 per dozen
Patent Solid Cast Steel, - - - - -	12 50	12 75	13 25	13 75	14 50 per dozen
Patent Solid Cast Steel, - - - - -	10 25	10 50	11 00	11 50	12 00 per dozen
Patent Solid Steel, - - - - -	8 25	8 50	8 75	9 25	9 75 per dozen

FIG. 1282.



FIG. 1283.



New Style Ditching and Drain Spades.

Made from best crucible cast steel. Warranted.

	List No.	Length, Inches.	Size.	Price.
D Handle, Ditching, Half Polished, - - - - -	119	14	2	\$14 25
D Handle, Ditching, Half Polished, - - - - -	120	16	3	15 25
D Handle, Ditching, Half Polished, - - - - -	121	18	4	16 50
D Handle, Ditching, Half Polished, - - - - -	121½	20	5	17 00
D Handle, Ditching, Full Polished, - - - - -	122	14	2	14 75
D Handle, Ditching, Full Polished, - - - - -	123	16	3	16 00
D Handle, Ditching, Full Polished, - - - - -	124	18	4	17 00
D Handle, Ditching, Full Polished, - - - - -	124½	20	5	18 00
D Handle, Drain, Half Polished, - - - - -	125	17	2	14 50
D Handle, Drain, Half Polished, - - - - -	126	19	3	15 50
D Handle, Drain, Half Polished, - - - - -	127	21	4	16 75
D Handle, Drain, Half Polished, - - - - -	127½	23	5	18 00
D Handle, Drain, Full Polished, - - - - -	128	17	2	15 00
D Handle, Drain, Full Polished, - - - - -	129	19	3	16 25
D Handle, Drain, Full Polished, - - - - -	130	21	4	17 25
D Handle, Drain, Full Polished, - - - - -	130½	23	5	19 00

Use list numbers when ordering.

FIG. 1284.



Drain Spade No. 3, with Foot Clasp.

Tapers from 4¼ inches at shoulder to 3 inches at point.

In ordering, give figure number, and state length of Ditching and Post Spades wanted.

Half Polished Ditching and Post Spades, 25 cents per dozen less than Polished. Unpolished, 50 cents per dozen less than Polished.

SHOVELS, SCOOPS AND SPADES.—Continued.

FIG. 1285.



Tapered Point, Solid Cast Steel, D Handle, Plain Back Grafting Spade.

FIG. 1286.



Socket Strap No. 2 Spade.
Solid Cast Steel.

FIG. 1287.



Concave Draining Spade.

	No. 1 14 in.	No. 2 15 in.	No. 3 16 in.	No. 4 17 in.	No. 5 18 in.	No. 6 19 in.	No. 7 20 in.	No. 8 21 in.	No. 9 22 in.
Black,	\$16 50	16 50	16 50	16 50	16 75	17 00	17 25	17 50	17 75
Polished,	17 50	17 50	17 50	17 50	17 75	18 00	18 25	18 50	18 75

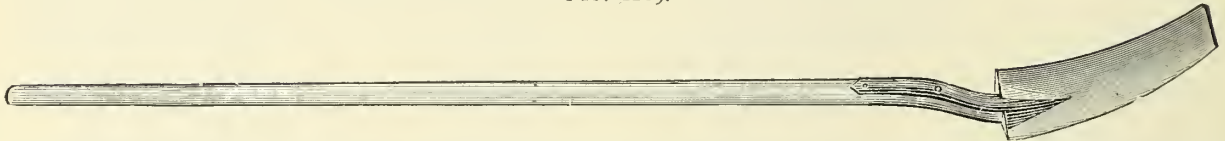
FIG. 1288.



Concave Ditching Spade.

	No. 1 14 in.	No. 2 15 in.	No. 3 16 in.	No. 4 17 in.	No. 5 18 in.	No. 6 19 in.	No. 7 20 in.	No. 8 21 in.	No. 9 22 in.
Black,	\$17 50	17 50	17 50	17 50	17 75	18 00	18 25	18 50	18 75
Polished,	18 50	18 50	18 50	18 50	18 75	19 00	19 25	19 50	19 75

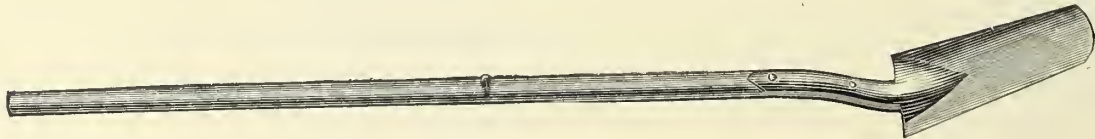
FIG. 1289.



Flat Drain Cleaner (To Push).

Black,	\$13 50, Size 11 3/4 x 6 1/2 x 5
Polished,	14 50, Size 11 3/4 x 6 1/2 x 5

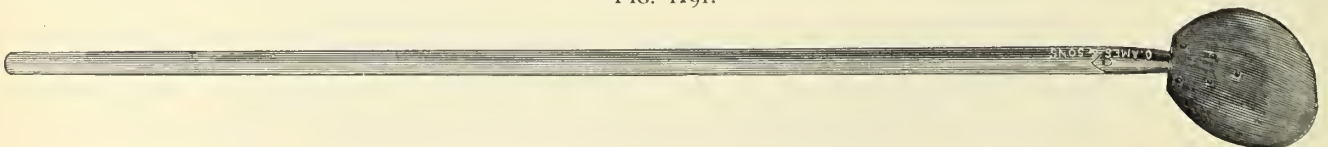
FIG. 1290.



Concave Drain Cleaner (To Push).

Black,	\$13 50, Size 11 3/4 x 5 1/4 x 3 1/2
Polished,	14 50, Size 11 3/4 x 5 1/4 x 3 1/2

FIG. 1291.



Spoon for Digging Out Post-holes.

Spoon for digging out post-holes, size 10 x 8 1/4 inches, length of handle, 7 feet,	\$9 00 per dozen
Spoon for digging out post-holes, size 10 x 8 1/4 inches, length of handle, 8 feet,	10 00 per dozen

PRICE LIST SHOVELS, SCOOPS AND SPADES. Fig. Nos. 1252 to 1291.

CAST STEEL EDGE PLATED SHOVELS.

BLACK.		No.	Per Doz.
D handle, plain back, square point shovels, -	-	0.	\$10 75
" " " " " " " "	-	1.	10 75
" " " " " " " "	-	2.	11 00
" " " " " " " "	-	3.	11 50
" " " " " " " "	-	4.	12 00
" " " " " " " "	-	5.	13 00
" " " " " " " "	-	6.	14 00
" " " " " " " "	-	7.	15 00
" " " " " " " "	-	8.	16 00
" " " " " " " "	-	9.	17 00
" " " " " " " "	-	10.	18 50
" " " " " " " "	-	11.	19 50
" " " " " " " "	-	12.	21 50
" " " " " " " "	-	13.	23 50
" " " " " " " "	-	14.	25 00
" " " " " " " "charcoal"	-	-	27 00
" " " " " " " "boys'"	-	-	7 00
" " " " " " " "brick"	-	-	11 00
" " " " " " " "round point"	-	1.	11 00
" " " " " " " " " "	-	2.	11 25
" " " " " " " " " "	-	3.	11 75
" " " " " " " " " "	-	4.	12 75
" " " " " " " " " "	-	5.	13 50
" " " " " " " " " "	-	6.	15 00
" " " " " " " " " "	-	7.	16 50
Long handle, plain back, square point shovels,	-	0.	10 75
" " " " " " " " " "	-	1.	10 75
" " " " " " " " " "	-	2.	11 00
" " " " " " " " " "	-	3.	11 50
" " " " " " " " " "	-	4.	12 00
" " " " " " " " " "	-	5.	13 00
" " " " " " " " " "round point"	-	0.	10 75
" " " " " " " " " " " "	-	1.	10 75
" " " " " " " " " " " "	-	2.	11 00
" " " " " " " " " " " "	-	3.	11 50
" " " " " " " " " " " "	-	4.	12 00
D handle, back strap, square point shovels, -	-	0.	10 00
" " " " " " " " " "	-	1.	10 00
" " " " " " " " " "	-	2.	11 00
" " " " " " " " " "	-	3.	11 50
" " " " " " " " " "	-	4.	12 50
" " " " " " " " " "	-	5.	13 25
" " " " " " " " " "	-	6.	14 25
Socket, plain back, round point shovels, without handles,	-	-	9 50

POLISHED.

D handle, plain back, square point shovels, -	-	1.	11 50
" " " " " " " " " "	-	2.	11 75
" " " " " " " " " "	-	3.	12 25
" " " " " " " " " "round point"	-	1.	11 75
" " " " " " " " " " " "	-	2.	12 00
" " " " " " " " " " " "	-	3.	12 50
Long handle, plain back, square point shovels,	-	1.	11 50
" " " " " " " " " "	-	2.	11 75
" " " " " " " " " "	-	3.	12 25
" " " " " " " " " "round point"	-	1.	11 50
" " " " " " " " " " " "	-	2.	11 75
" " " " " " " " " " " "	-	3.	12 25

PATENT PLAIN BACK SOLID CAST STEEL SHOVELS AND SPADES.

D handle, square point shovels, polished, -	-	2.	12 50
" " " " " " " " " "	-	3.	13 00
" " " " " " " " " "round point"	-	2.	13 00
" " " " " " " " " " " "	-	3.	13 50
Long handle, square point, shovels, polished,	-	2.	12 50
" " " " " " " " " "	-	3.	13 00
" " " " " " " " " "round point"	-	2.	12 50
" " " " " " " " " " " "	-	3.	13 00
D handle, square point shovels, black,	-	2.	11 75
" " " " " " " " " "	-	3.	12 50
" " " " " " " " " "round point"	-	2.	12 50
" " " " " " " " " " " "	-	3.	13 00
Long handles, square point " " " "	-	2.	11 75
" " " " " " " " " " " "	-	3.	12 50
" " " " " " " " " "round point"	-	2.	11 75
" " " " " " " " " " " "	-	3.	12 50
D handle spades, polished, -	-	1.	12 50
" " " " " " " " " "	-	2.	12 50

D handle, square-point shovels, -	-	9.	\$16 50
" " " " " " " " " "round-point"	-	2.	12 00
" " " " " " " " " " " "	-	3.	12 50
" " " " " " " " " " " "	-	4.	13 50
Long handle, square-point shovels, -	-	1.	11 50
" " " " " " " " " "	-	2.	11 50
" " " " " " " " " "	-	3.	12 00
" " " " " " " " " "	-	4.	12 75
" " " " " " " " " "	-	5.	13 50
" " " " " " " " " "round-point"	-	1.	11 50
" " " " " " " " " " " "	-	2.	11 50
" " " " " " " " " " " "	-	3.	12 25
Long handle, California round-point shovels,	-	2.	11 50
" " " " " " " " " "round spring-point,"	-	2.	11 50
D handle spades, -	-	1.	11 50
" " " " " " " " " "	-	2.	11 50
" " " " " " " " " "	-	3.	12 25
" " " " " " " " " "	-	4.	13 00
" " " " " " " " " "long strap spades,"	-	2.	12 75
" " " " " " " " " " " "	-	3.	13 50
" " " " " " " " " "mining"	-	-	10 00
Long handle " " " " " " " "	-	1.	11 50
" " " " " " " " " "	-	2.	11 50
" " " " " " " " " "	-	3.	12 25
" " " " " " " " " "long strap"	-	2.	12 75
" " " " " " " " " " " "	-	3.	13 50

Unpolished shovels and spades 50 cents less per dozen.

WESTERN PATTERN COAL SHOVELS.

Sanderson's best steel half polished, -	-	2.	8 75
" " " " " " " " " "	-	3.	9 00
" " " " " " " " " "black,"	-	2.	8 50
" " " " " " " " " " " "	-	3.	8 75

COFFEE SHOVELS, POLISHED CAST STEEL BACK STRAP.

D handle coffee shovels, -	-	1.	\$
" " " " " " " " " "	-	2.	-
" " " " " " " " " "	-	3.	-
" " " " " " " " " "	-	4.	-
" " " " " " " " " "	-	5.	-
" " " " " " " " " "	-	6.	-
" " " " " " " " " "	-	7.	-

T handle coffee shovels, \$1.00 more per dozen.

EXTRA HEAVY RAILROAD PATENT WELDED BROAD STRAPS, SOLID CAST STEEL SHOVELS, SPADES, AND ROUND POINTS.

	Size.	Black.	Polished.
D handle, plain black, square points,	2.	\$9 75	\$10 25
" " " " " " " " " "	3.	10 25	10 75
Long " " " " " " " " " "	2.	9 75	10 25
" " " " " " " " " "	3.	10 25	10 75
D " " " " " " " " " "round points,"	2.	9 75	10 25
" " " " " " " " " " " "	3.	10 25	10 75
Long " " " " " " " " " "	2.	9 75	10 25
" " " " " " " " " "	3.	10 25	10 75
" " " " " " " " " "spades,"	2.	9 75	10 25
" " " " " " " " " " " "	3.	10 25	10 75
D " " " " " " " " " "	2.	9 75	10 25
" " " " " " " " " " " "	3.	10 25	10 75

SCOOPS.

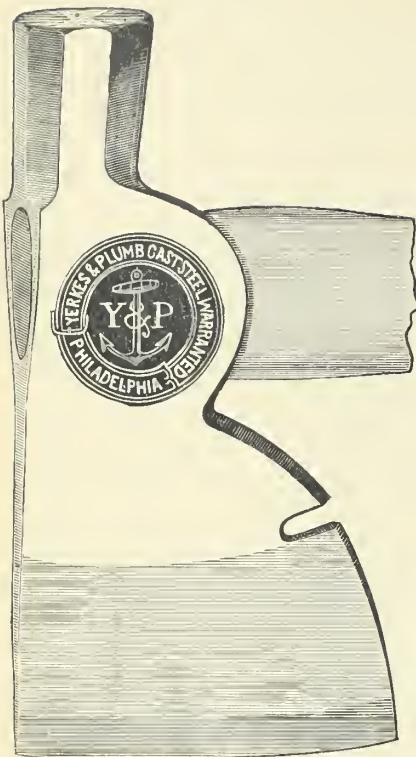
	No.	Per Doz.
O Ames's cast steel, polished, -	2.	\$13 50
" " " " " " " " " "	3.	13 75
" " " " " " " " " "	4.	14 25
" " " " " " " " " "	5.	14 50
" " " " " " " " " "	6.	15 00
" " " " " " " " " "	7.	15 50
" " " " " " " " " "	8.	16 00
" " " " " " " " " "	9.	16 75
" " " " " " " " " "	10.	17 50
" " " " " " " " " "	11.	18 00
" " " " " " " " " "	12.	19 00
" " " " " " " " " "	13.	20 00

MOULDERS' SHOVELS, POLISHED.

	Size.	Price per Doz.
T. Rowland's Sons' D handle, C. S. back strap, sq. pt.,	2.	\$12 50
" " " " " " " " " "steel " " " "	2.	11 00
J. Thomas' " " " " C. S. " " " "	2.	10 50

HATCHETS.

FIG. 1292.



HALF.

SHINGLING HATCHETS.

No. 1292,	-	Size 0,	-	per dozen, \$7.50
-	-	" 1,	-	" 8.00
-	-	" 2,	-	" 8.50
-	-	" 3,	-	" 9.00
-	-	" 4,	-	" 9.50

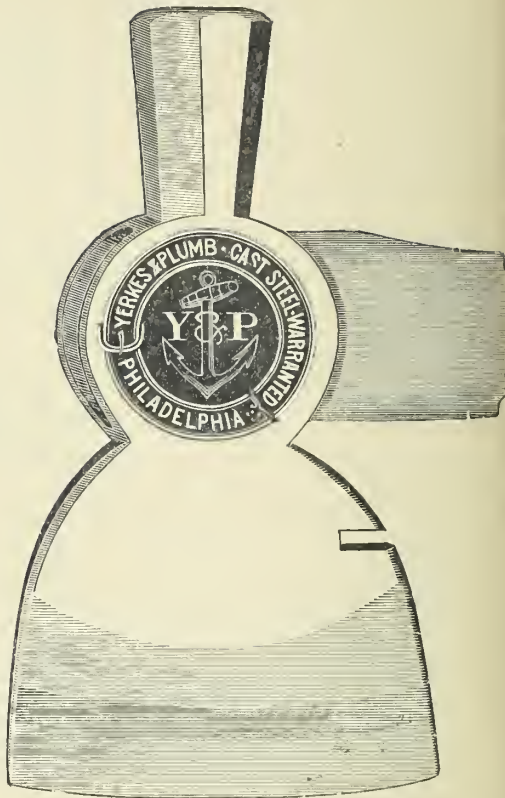
HALF HATCHETS.

No. 1293,	-	Size 1,	-	per dozen, \$8.50
-	-	" 2,	-	" 9.00
-	-	" 3,	-	" 9.50
-	-	" 4,	-	" 10.00

BROAD HATCHET.

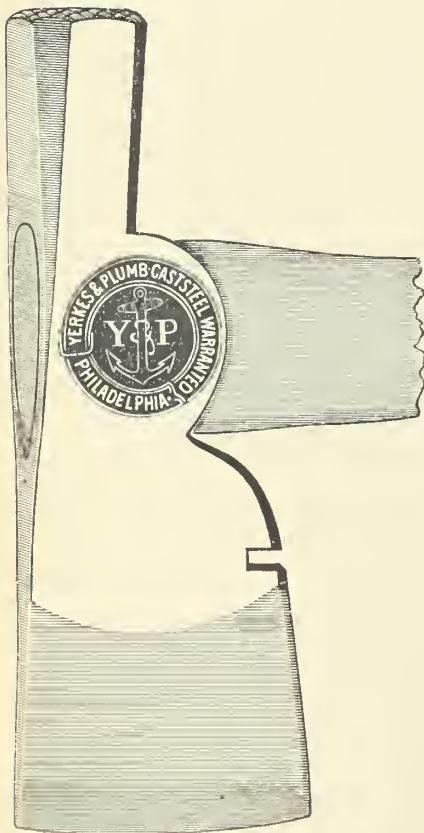
Size 1,	-	per dozen, \$10.50
" 2,	-	" 11.50
" 3,	-	" 13.00
" 4,	-	" 14.50
" 5,	-	" 16.50
" 6,	-	" 18.00
" 7,	-	" 19.50
" 8,	-	" 22.00

FIG. 1293.



SHINGLING.

FIG. 1295.



LATHING.

CLAW HATCHETS.

No. 1294,	-	Size 1,	-	per dozen, \$9.00
-	-	" 2,	-	" 9.50
-	-	" 3,	-	" 10.00

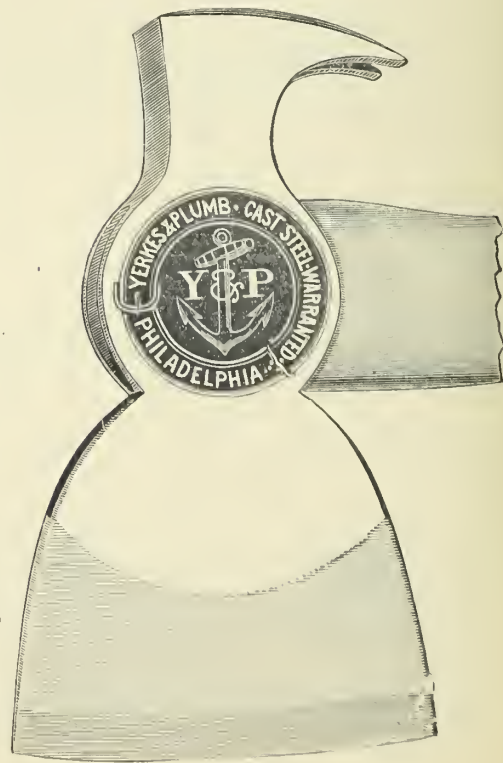
LATHING HATCHETS.

No. 1295,	-	Size 0,	-	per dozen, \$7.50
-	-	" 1,	-	" 8.00
-	-	" 2,	-	" 8.50
-	-	" 3,	-	" 9.00

BARREL HATCHETS.

Size 1,	-	per dozen, \$8.00
" 2,	-	" 8.50

FIG. 1294.



CLAW.

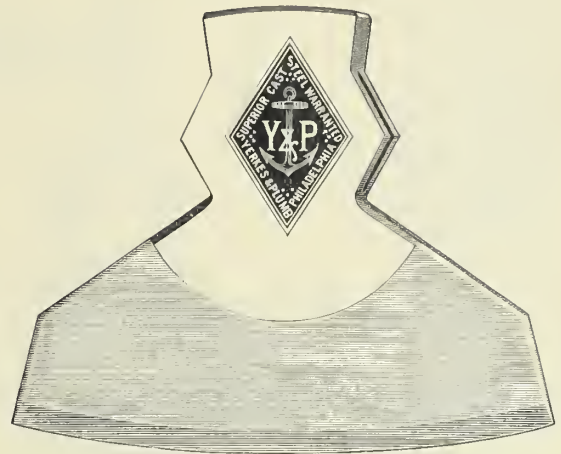
BROAD AXES.

FIG. 1296.



OHIO PATTERN.

FIG. 1297.



NEW ORLEANS PATTERN.

FIG. 1298.



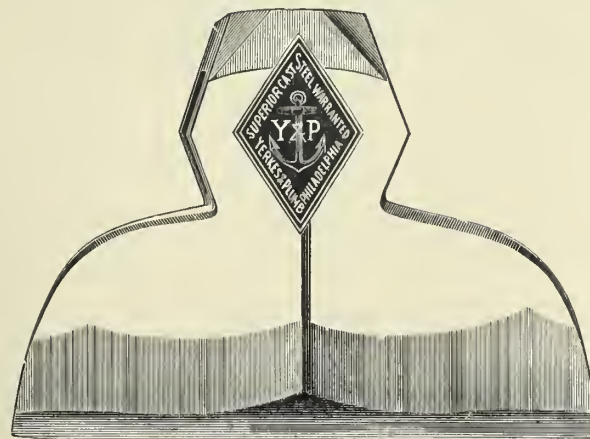
WESTERN PATTERN.

FIG. 1299.



PENNSYLVANIA OR PITTSBURG PATTERN.

FIG. 1300.



CANADA PATTERN.

BROAD AXES.

(CANADA PATTERN.)

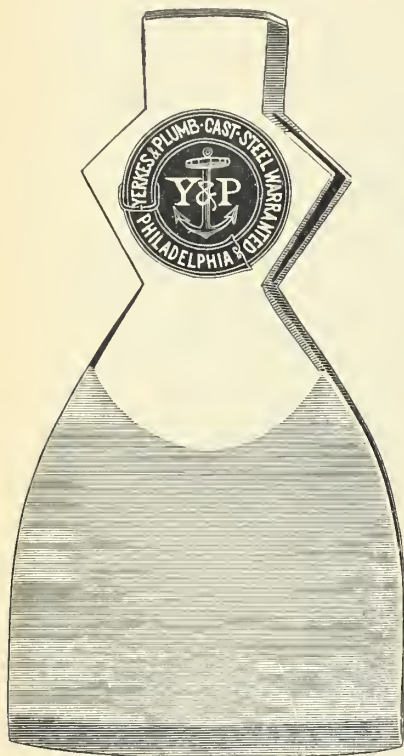
Assorted Weights.	Per Dozen.
5 to 7 pounds, - -	\$38.00
7 to 9 pounds, - -	42.00
9 to 11 pounds, - -	46.00

OHIO, PENNSYLVANIA OR PITTSBURG, WESTERN AND NEW ORLEANS PATTERNS.

Assorted Weights.	Per Dozen.
5 to 6½ pounds, - -	\$32.00
6 to 7 pounds, - -	32.00
6½ to 7½ pounds, - -	32.00
7 to 8 pounds, - -	35.00
7½ to 8½ pounds, - -	35.00
7 to 9 pounds, - -	35.00
8 to 9 pounds, - -	38.00
8½ to 9½ pounds, - -	38.00
8 to 10 pounds, - -	38.00

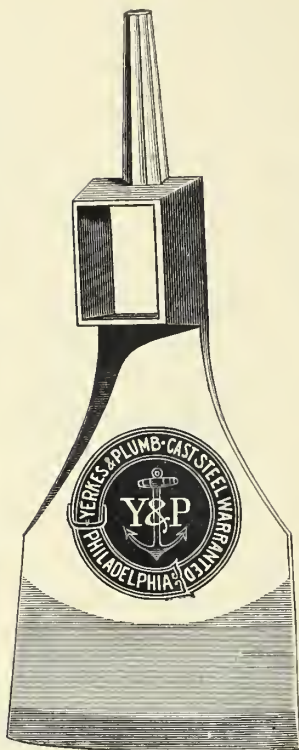
BROAD AXE.

FIG. 1301.



SHIP PATTERN.

FIG. 1302.



SHIP CARPENTER,
WITH SPURHEAD.

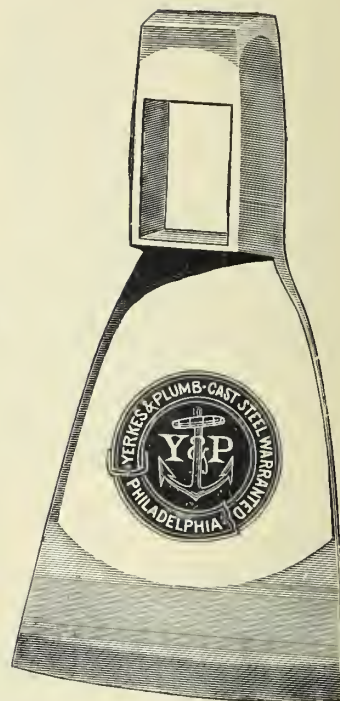
ADZES.

FIG. 1303.



CARPENTERS' HALF HEAD.

FIG. 1304.



CARPENTERS' FULL HEAD.

FIG. 1305.



RAILROAD HALF HEAD.

FIG. 1306.



RAILROAD FULL HEAD.

BROAD AXES.

(SHIP PATTERN.)

No. 1301, - - - \$30.00 per dozen

SHIP CARPENTERS' ADZES.

(SPUR HEAD.)

No. 1302,	Width of Cut,	Per Doz.
4 to 4½ inches,	- - -	\$25.00
4 to 4½ inches,	(with lip)	30 00

CARPENTERS' ADZES.

(HALF HEAD.)

No. 1303, - - - \$24.00 per dozen

CARPENTERS' ADZES.

(FULL HEAD.)

No. 1304, - - - \$24.00 per dozen

RAILROAD ADZES.

(HALF HEAD.)

No. 1305,	Width of Cut,	Per Doz.
5 to 5½ inches,	- - -	\$26.00
5¾ to 6 inches,	- - -	27.00

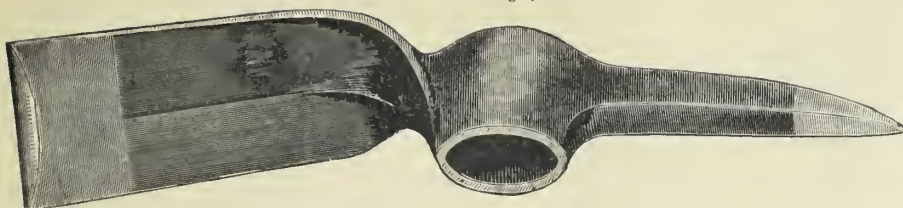
RAILROAD ADZES.

(FULL HEAD.)

No. 1306,	Width of Cut,	Per Doz.
5 to 5½ inches,	- - -	\$26.00
5¾ to 6 inches,	- - -	27.00

MATTOCKS, HOES, &c.

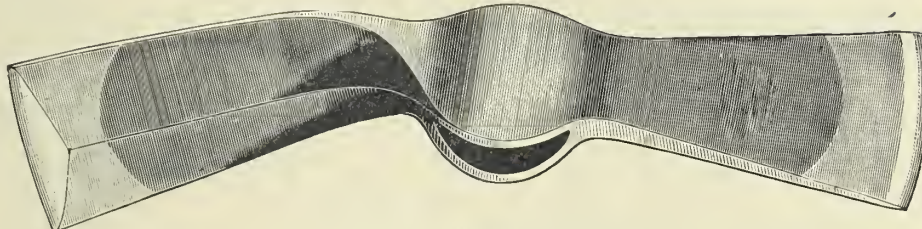
FIG. 1307.



COOPER FROES—No. 6, ADZE EYE.

No. 10 8 inches, per dozen,	-	\$13.00	No. 10 14 inches, per dozen,	-	\$14.50
" 10 12 inches, per dozen,	-	14.00	" 10 16 inches, per dozen,	-	15.00
" 10 16 inches, per dozen,	-	15.00			

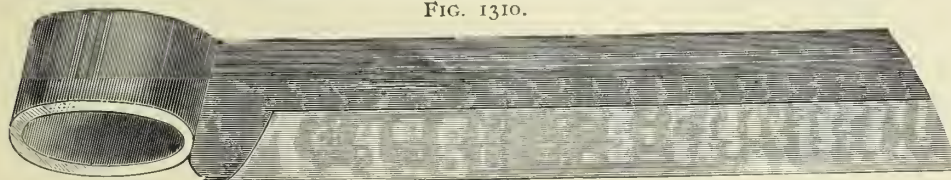
FIG. 1309.



MATTOCKS—LONG CUTTER. No. 4.

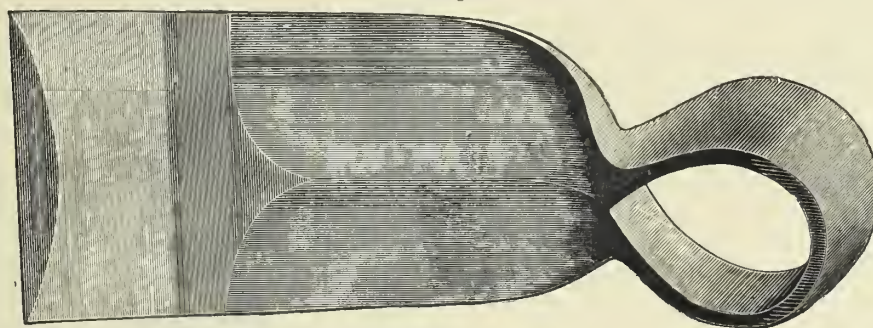
No. 2 Adze eye, long cutter, 6 pounds, per dozen,	-	-	-	-	\$16.00
" 3 Adze eye, short cutter, 5½ pounds, per dozen,	-	-	-	-	15.50
" 2 Adze eye, long cutter, light, per dozen,	-	-	-	-	15.00
" 3 Adze eye, short cutter, light, per dozen,	-	-	-	-	15.00
" 4 Hunt eye, long cutter, 6 pounds, per dozen,	-	-	-	-	16.00
" 5 Hunt eye, short cutter, 5½ pounds, per dozen,	-	-	-	-	15.00
" 6 Adze eye, pick mattocks, per dozen,	-	-	-	-	16.00
" 7 Hunt eye, pick mattocks, per dozen,	-	-	-	-	16.00

FIG. 1310.



COOPER FROES, No. 10.

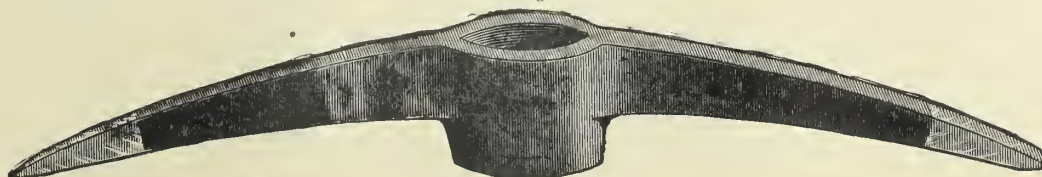
FIG. 1311.



GRUB HOES, No. 8.

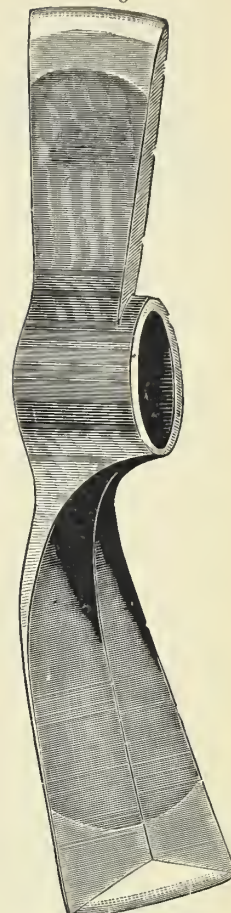
No. 8 Western pattern, No. 0, 3 pounds, per dozen,	-	-	-	-	-	\$10.50
" 8 Western pattern, No. 1, 3½ pounds, per dozen,	-	-	-	-	-	11.00
" 8 Western pattern, No. 2, 4 pounds, per dozen,	-	-	-	-	-	11.50
" 8 Western pattern, No. 3, 4½ pounds, per dozen,	-	-	-	-	-	12.00
" 9 Baltimore pattern, No. 1, 3½ pounds, per dozen,	-	-	-	-	-	11.00
" 9 Baltimore pattern, No. 2, 4½ pounds, per dozen,	-	-	-	-	-	11.75
" 9 Baltimore pattern, No. 3, 5 pounds, per dozen,	-	-	-	-	-	12.75
" 9 Baltimore pattern, No. 4, 5¾ pounds, per dozen,	-	-	-	-	-	13.50

FIG. 1312.



TAMPING PICK—ADZE EYE, No. 14.

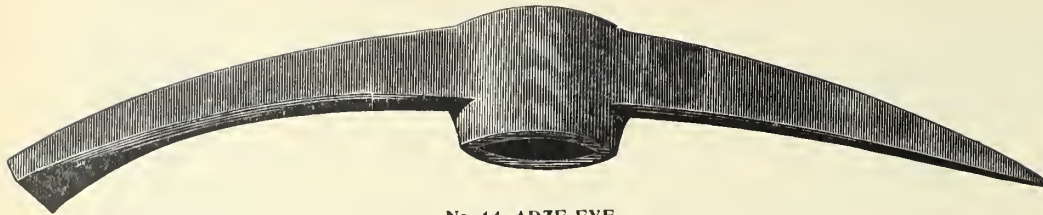
FIG. 1308.



No. 2.

PICKS.

FIG. 1313.



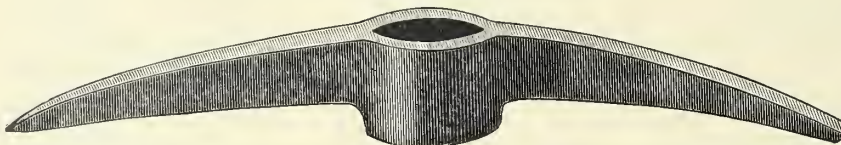
No. 14, ADZE EYE.

FIG. 1314.



No. 55.

FIG. 1315.



No. 54.

RAILROAD OR CLAY PICKS.

No. 11	Adze eye, 4 to 5 lbs.,	-	-	-	-	per doz.,	\$11 00
" 11	" 5 to 6 "	-	-	-	-	"	12 00
" 11	" 6 to 7 "	-	-	-	-	"	13 00
" 11	" 7 to 8 "	-	-	-	-	"	14 00
" 11	" 8 to 9 "	-	-	-	-	"	16 00
" 11	" 9 to 10 "	-	-	-	-	"	18 00
" 12	Hunt eye, 4 to 5 "	-	-	-	-	"	11 00
" 12	" 5 to 6 "	-	-	-	-	"	12 00
" 12	" 6 to 7 "	-	-	-	-	"	13 00
" 12	" 7 to 8 "	-	-	-	-	"	14 00

ORE PICKS.

Regular point and chisel ends, or double pointed when ordered.
Extra quantity and quality of steel when ordered.

No. 54	Adze eye, 5 to 6 lbs.,	-	-	-	-	per doz.,	\$12 00
" 54	" 6 to 7 "	-	-	-	-	"	13 00
" 54	" 7 to 8 "	-	-	-	-	"	14 00

ADZE EYE CONTRACTORS' PICKS.

No. 55	Adze eye, 7 lbs.	-	-	-	-	per doz.,	\$18 00
" 55	" 7½ "	-	-	-	-	"	18 50
" 55	" 8 "	-	-	-	-	"	19 00
" 55	" 8½ "	-	-	-	-	"	20 00
" 55	" 9 "	-	-	-	-	"	21 00
" 55	" 9½ "	-	-	-	-	"	22 00
" 55	" 10 "	-	-	-	-	"	23 00

STEEL LAKE SUPERIOR MINING PICK.

No. 56, special price and quality.

TAMPING PICKS.

No. 14	Adze eye, 6 to 7 lbs.,	-	-	-	-	per doz.,	\$17 00
" 14	" 7 to 8 "	-	-	-	-	"	18 00
" 14	" 8 to 9 "	-	-	-	-	"	19 00
" 13	Hunt eye, 6 to 7 "	-	-	-	-	"	17 00
" 13	" 7 to 8 "	-	-	-	-	"	18 00
" 13	" 8 to 9 "	-	-	-	-	"	19 00

STONE PICKS.

No. 18,	6 to 7 lbs.,	-	-	-	-	per doz.,	\$16 50
" 18,	7 to 8 "	-	-	-	-	"	17 50
" 18,	8 to 9 "	-	-	-	-	"	17 50

FIG. 1316.



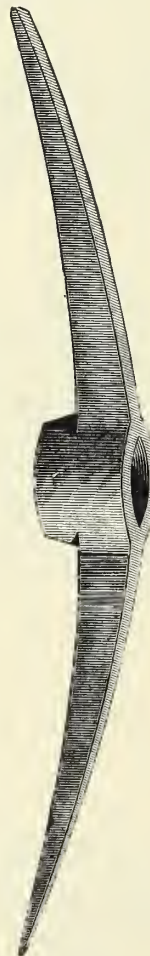
No. 18.

FIG. 1317.



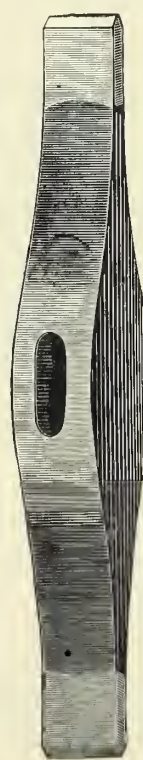
No. 20.

FIG. 1318.



No. 19.

FIG. 1319.



No. 22.

FIG. 1320.



ADZE EYE. No. 15.

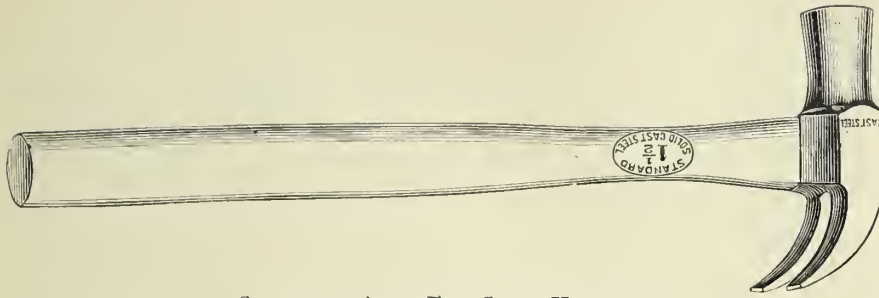
FIG. 1321.



No. 21.

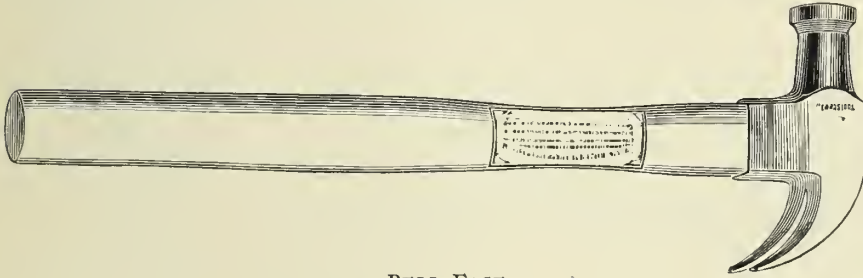
HAMMERS.

FIG. 1322.



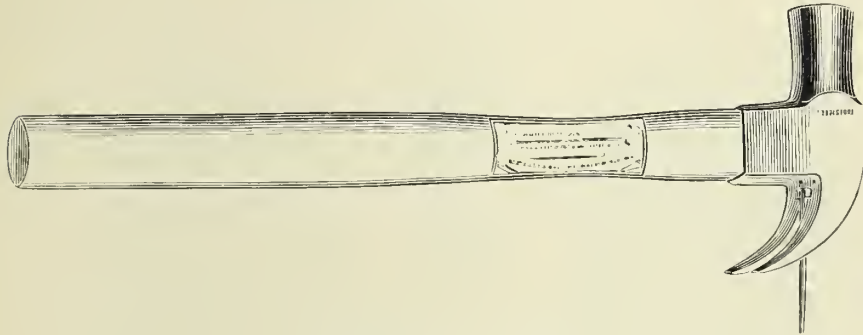
STANDARD ADZE-EYE CLAW HAMMERS.

FIG. 1323.



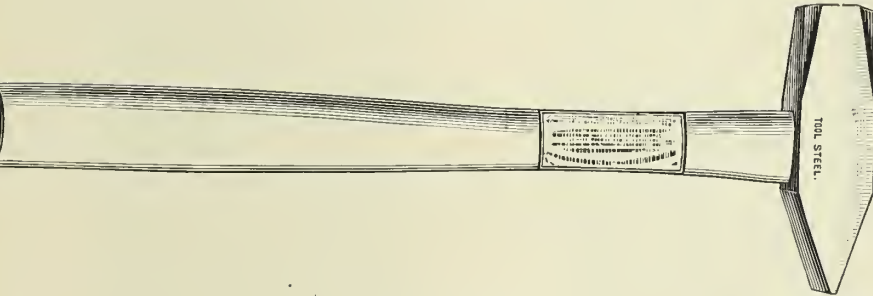
BELL FACE.

FIG. 1324.



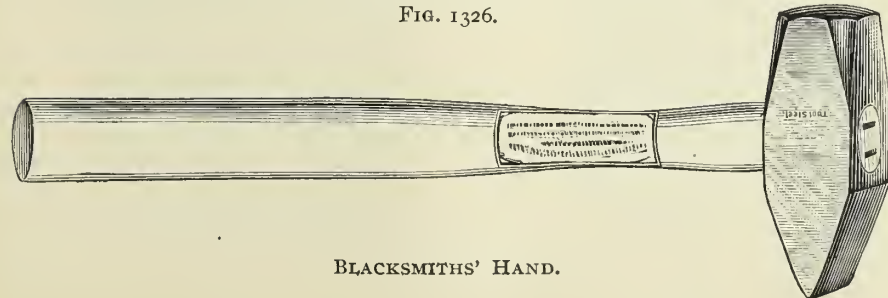
PATENT NAIL HOLDER.

FIG. 1325.



RIVETING HAMMERS.

FIG. 1326.



BLACKSMITHS' HAND.

ADZE-EYE HAMMERS.

No.	Weight	Per Doz.
No. 5.	Round. Weight, 1 lb., 4 oz.,	\$9.00
No. 7.	Round. Weight, 1 lb.,	8.50
No. 7½.	Round. Weight, 13 oz.,	8.00
No. 8.	Round. Weight, 7 oz.,	7.50
No. 17.	Octagon. Weight, 1 lb., 4 oz.,	9.00
No. 33.	Patent Nail Holder, Bell Face. Weight, 1 lb., 4 oz.,	9.50
No. 34.	Patent Nail Holder, Bell Face. Weight, 1 lb.,	9.00
No. 35.	Patent Nail Holder, Round Head. Weight, 1 lb., 4 oz.,	9.50
No. 36.	Patent Nail Holder, Round Head. Weight, 1 lb.,	9.00
No. 37.	Bell Face. Weight, 1 lb., 4 oz.,	9.00
No. 38.	Bell Face. Weight, 1 lb.,	8.50
No. 38½.	Bell Face. Weight, 13 oz.,	8.00
No. 39½.	Bell Face. Weight, 7 oz.,	7.50
No. 45.	Straight Claw. Weight, 1 lb., 4 oz.,	9.00

RIVETING HAMMERS.

No.	Weight	Per Doz.
No. 65.	Adze-Eye. Octagon. Weight, 1 lb.,	\$8.50
No. 70.	Plain. Octagon. Weight, 1 lb., 10 oz.,	8.00
No. 71.	Plain. Octagon. Weight, 1 lb., 2 oz.,	7.00
No. 72.	Plain. Octagon. Weight, 15 oz.,	6.50
No. 73.	Plain. Octagon. Weight, 12 oz.,	6.25
No. 74.	Plain. Octagon. Weight, 9 oz.,	6.00
No. 75.	Plain. Octagon. Weight, 7 oz.,	5.75
No. 76.	Plain. Octagon. Weight, 4 oz.,	5.50

BLACKSMITHS' HAND HAMMERS.

No.	Weight	Per Doz.
No. 100.	Weight, 3 lbs.,	\$16.00
No. 101.	Weight, 2 lbs., 10 oz.,	15.00
No. 102.	Weight, 2 lbs., 14 oz. (Shoulder Pein),	16.00

FIG. 1327.



RIVETING HAMMER.

ADZE EYE.

Solid Cast Steel.

Size, No.	Weight	Price, per doz.
1	240	6 oz.
2	241	9 oz.
3	242	12 oz.
4	243	1 lb.
5	244	1 lb. 4 oz.
		9.00
		8.50
		8.00
		7.50
		7.00

COOPERS' HAMMERS.

Solid Cast Steel.

Numbers.	Size.	Weight.	Price Per Dozen.
290	1	2 lb.	\$16
291	2	2 lb. 8 oz.	\$17
292	3	3 lb.	\$18
293	4	3 lb. 8 oz.	\$19
294	5	4 lb.	\$20
295	6	4 lb. 8 oz.	\$21
296	7	5 lb.	\$22

HAMMERS.—Continued

MACHINISTS' BALL PEIN HAMMERS.

No.	90.	Octagon.	Weight,	3 pounds,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Per Doz.
"	90½.	"	"	2	"	8 ounces	-	-	-	-	-	-	-	-	-	-	-	-	\$22 00
"	91.	"	"	2	"	4	"	-	-	-	-	-	-	-	-	-	-	-	19 00
"	92.	"	"	2	"			-	-	-	-	-	-	-	-	-	-	-	17 50
"	92½.	"	"	1	"	12	"	-	-	-	-	-	-	-	-	-	-	-	16 50
"	93.	"	"	1	"	8	"	-	-	-	-	-	-	-	-	-	-	-	15 50
"	94.	"	"	1	"	4	"	-	-	-	-	-	-	-	-	-	-	-	14 50
"	95.	"	"	1	"			-	-	-	-	-	-	-	-	-	-	-	13 50
"	96.	"	"	"	"	12	"	-	-	-	-	-	-	-	-	-	-	-	12 50
"	97.	"	"	"	"	8	"	-	-	-	-	-	-	-	-	-	-	-	12 00
"	98.	"	"	"	"	6	"	-	-	-	-	-	-	-	-	-	-	-	12 00

ENGINEERS' BALL PEIN HAMMERS.

No. 105.	Weight, 2 pounds,																	Per Doz.
" 106.	" 1 "	8 ounces,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	\$16 5
" 107.	" 1 "	4 ounces,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 5
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13 5

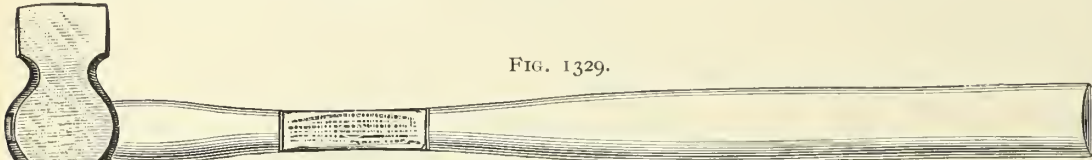
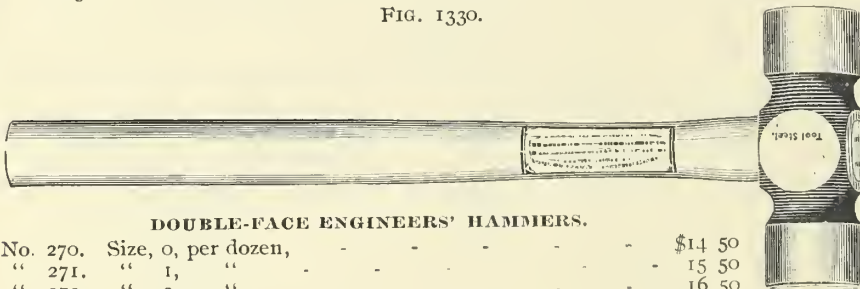


FIG. 1329.

MACHINISTS' CHIPPING HAMMERS.

No. 110.	Straight Pein.	Weight, 1 pound, 12 ounces,																Per Doz.
" 111.	"	" 1 "	8 "	-	-	-	-	-	-	-	-	-	-	-	-	-	-	\$15 50
" 112.	"	" 1 "	4 "	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 50
" 113.	"	"	12 "	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13 50
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 00

FIG. 1330.



DOUBLE-FACE ENGINEERS' HAMMERS.

No. 270.	Size, 0, per dozen,																	
" 271.	" 1,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	\$14 50
" 272.	" 2,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15 50
" 273.	" 3,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16 50
" 274.	" 4,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18 00
																		19 50

MACHINISTS' CROSS PEIN HAMMERS.

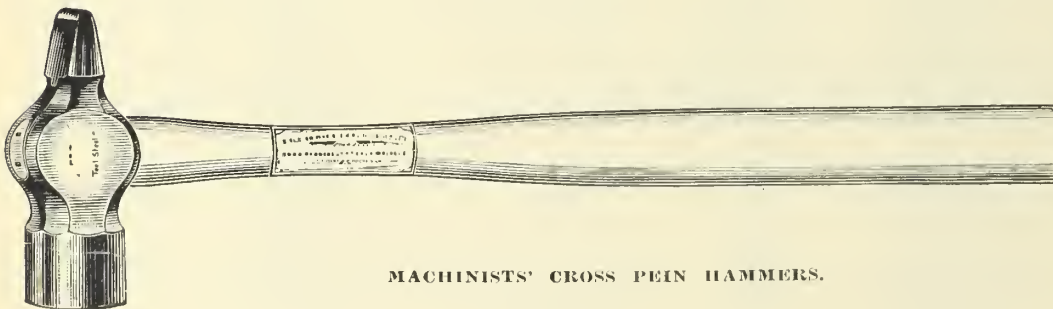
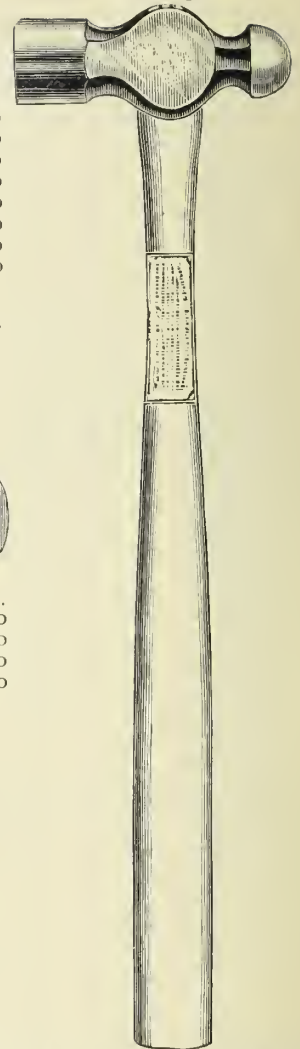


FIG. 1331.

MACHINISTS' BALL PEIN HAMMERS

FIG. 1328.



BOILER-MAKERS' RIVETING HAMMERS.

Octagon pattern face and pein.
Oil finished, polished faces, solid
cast steel.

No.	Size.	Weight.	Doz.	Price.
2600	1 1 lb. 8 oz.,			\$14 50
2601	2 2 lb.			16 50
2602	3 2 lb. 8 oz.,			19 00
2603	4 3 lb.			22 00

Weights do not include
handles.

HAND DRILLING HAMMERS.

Solid cast steel, stone cutters on short pattern.

No. 890.	Polished face, oil finished, under 3 pounds,																		Per Pound.
" 890.	"	" 3 to 5 pounds,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	\$0 45
" 892.	Full polished,	" 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40
" 892.	"	" 3 to 5 "	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52½
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47½

SLEDGES AND HAMMERS.

COAL PICKS.

No.	Weight,	Per doz.	No.	Weight,	Per doz.	No.	Weight,	Per doz.
16.	2 lbs.	\$8 50	16.	4 lbs.	\$10 50	16.	6 lbs.	\$12 50
16.	2½ "	9 00	16.	4½ "	11 00	16.	6½ "	13 00
16.	3 "	9 50	16.	5 "	11 50	16.	7 "	14 00
16.	3½ "	10 00	16.	5½ "	12 00			

ADZE EYE COAL PICKS.

No. 15. - - - Same list as No. 16

ANTHRACITE COAL PICKS.

No. 17. - - - Same list as No. 16

ALTON PATTERN COAL PICKS.

No. 53. Long Ear Pattern, - 50 cents per dozen additional on list of No. 16
Special Coal Picks of any desired pattern made to order from templet or drawing.

MILL PICKS.

No. 22. Mill Picks, Cast Steel, 2 to 3 lbs, - per dozen, \$22 00

ADZE EYE MINERS' PICKS.

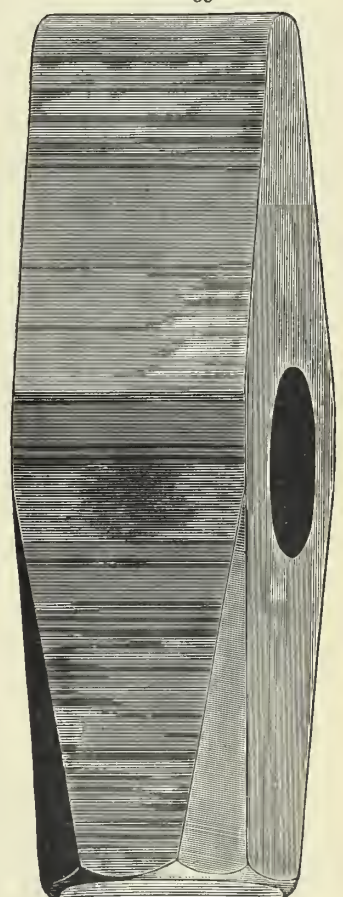
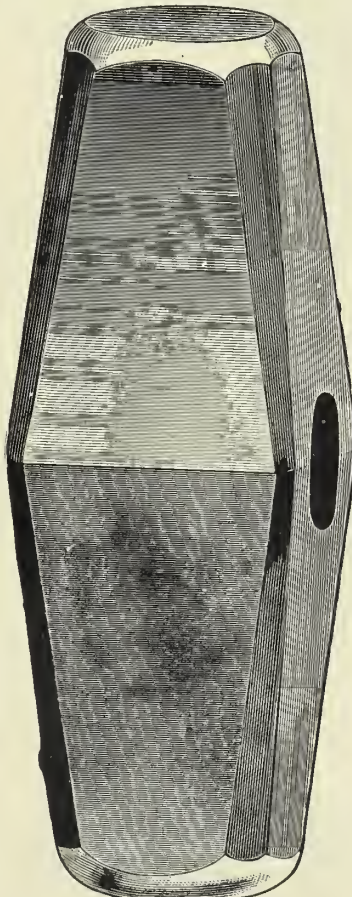
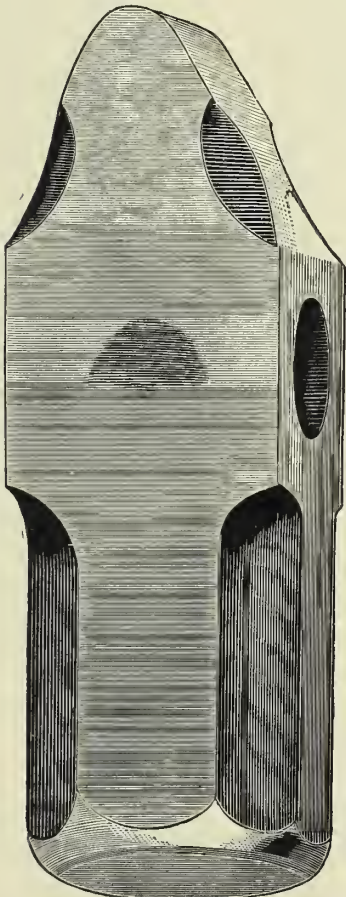
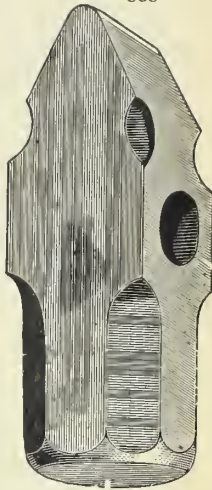
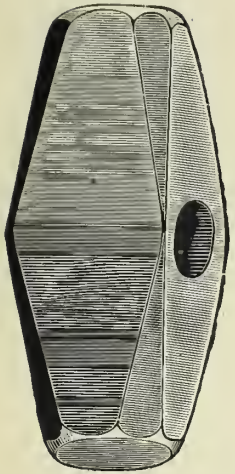
No.	Per doz.	No.	Per doz.	No.	Per doz.
19. Surface, No. 1, 4 lbs.	\$14 00	19. Surface, No. 7, 7 lbs.	\$20 00	21. Poll, No. 1, 3½ lbs.	\$15 00
19. " " 2, 4½ "	15 00	20. Drifting " 1, 3 "	12 50	21. " " 2, 4 "	16 00
19. " " 3, 5 "	16 00	20. " " 2, 4 "	14 00	21. " " 3, 4½ "	17 00
19. " " 4, 5½ "	17 00	20. " " 3, 4½ "	15 00	21. " " 4, 5 "	18 50
19. " " 5, 6 "	18 00	20. " " 4, 5 "	16 00	21. " " 5, 6 "	20 00
19. " " 6, 6½ "	19 00	20. " " 5, 6 "	17 50	21. " " 6, 6¾ "	21 50

SOLID CAST STEEL SLEDGES.

No. 42.
Solid Cast Steel.

No.		5 lbs. and over.	3 to 5 lbs.	Under 3 lbs.
34. Smiths' Sledges,	-	\$0 30	\$0 36	\$0 45
35. Stone " "	-	30	36	45
36. Striking " "	-	30	36	45
37. Coal " "	-	30	36	45

No. 44
Solid Cast Steel.



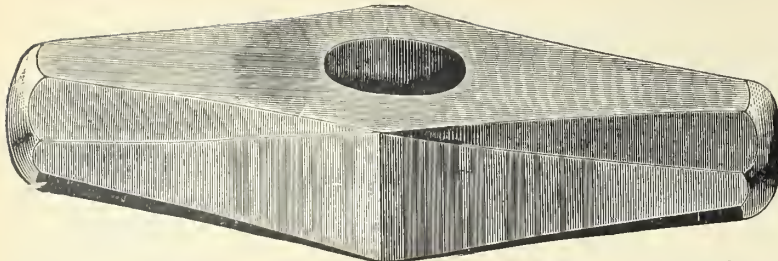
No. 34.

No. 35.

No. 36.

HAMMERS, MAULS, &c.

FIG. 1337.

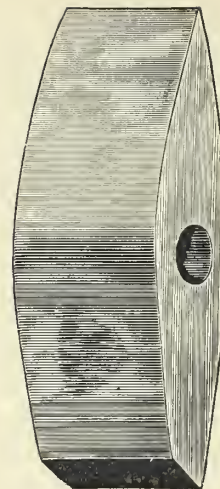


No. 45.

SOLID CAST STEEL HAMMERS.

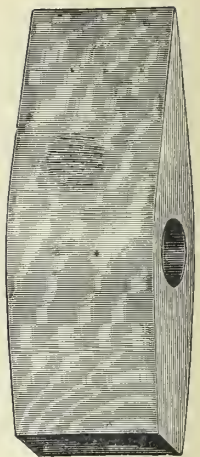
No.	5 lbs. and over.	3 to 5 lbs.	Under 3 lbs.
43, Hand drilling hammers, - - - - -	\$0 36	\$ 40	\$ 45
45, Napping hammers, - - - - -	30	36	45
39, Mason hammers, - - - - -	40	45	50
42, Smiths' hand hammers, - - - - -	30	36	45
44, Drilling or striking hammers, - - -	30	36	45
40 and 41, Spalling or stone hammers, -	36	40	45

FIG. 1338.



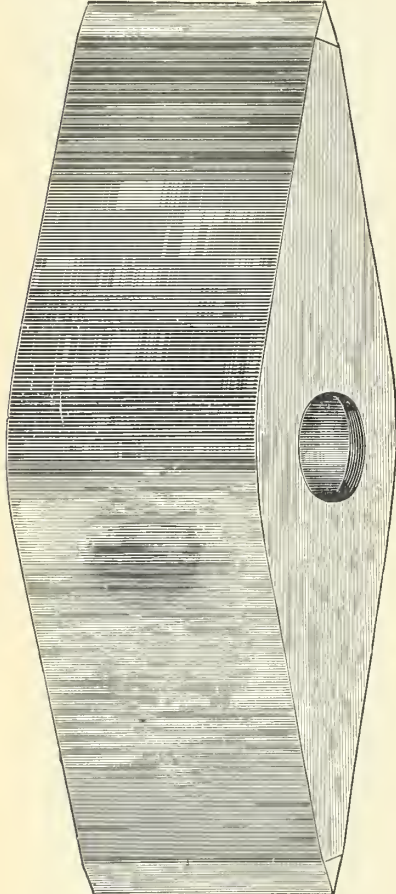
No. 40.

FIG. 1339.



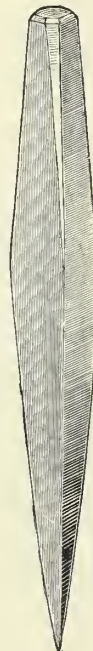
No. 39.

FIG. 1340.



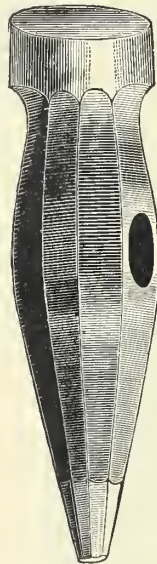
No. 38.

FIG. 1342.



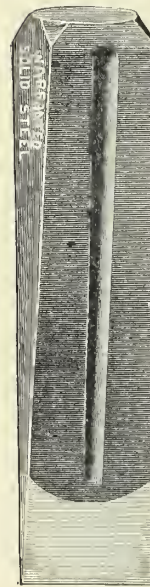
No. 51.

FIG. 1341.



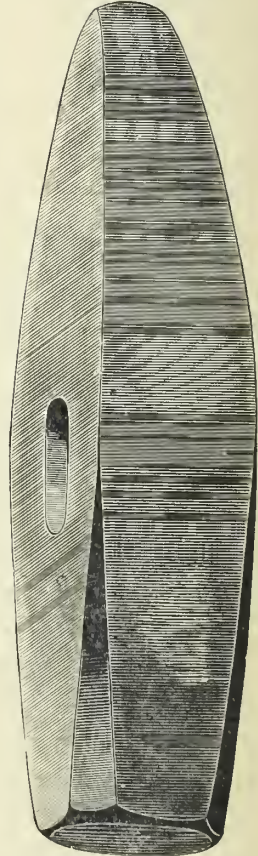
No. 49.

FIG. 1343.



No. 68.

FIG. 1344.



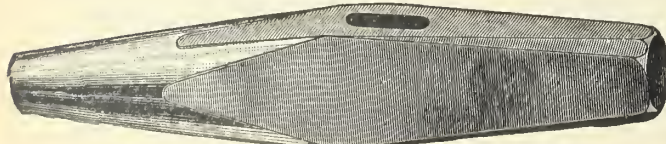
No. 48.

SOLID CAST STEEL MAULS, STEEL WEDGES, ETC.

No. 51, Steel wedges, coal, - - - - -	per lb., \$0 20
" 52, Steel wedges, stone, - - - - -	" 20
" 68, Steel wedges, wood, - - - - -	" 20
" 50, Steel wedges, wood, truckee, 1st quality, - - -	" 25
" 50, Steel wedges, wood, truckee, 2d quality, - - -	" 20
" 49, Ship or top maul all sizes, - - - - -	" 42
" 46, Wood choppers' maul, straight cut - - - - -	" 36
" 38, Stone or granite axe, all sizes, - - - - -	" 50
" 67, Octagon pattern, turning sledge, - - - - -	" 40

Steel-faced, instead of solid cast steel hammers and sledges, made in any desired pattern to order.

FIG. 1345.



RAILROAD TRACK PUNCH, ROUND POINT. No. 58.

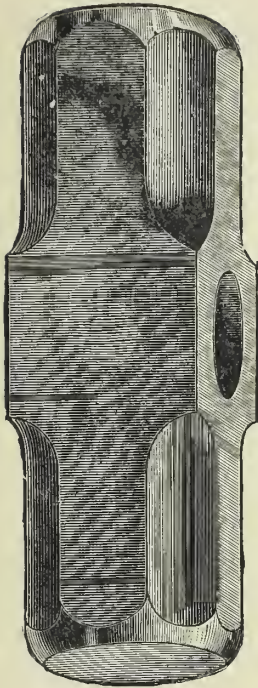
FIG. 1346.



RAILROAD TRACK WRENCH. No. 60.

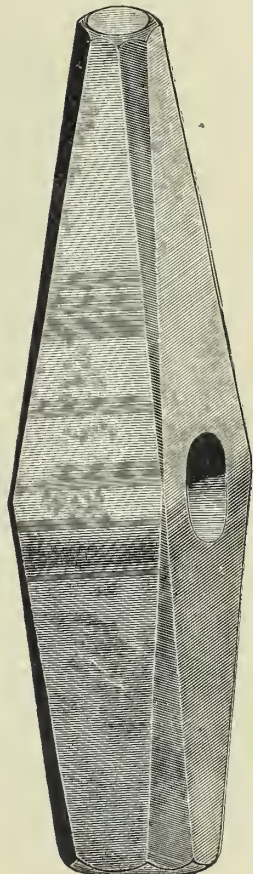
STANDARD RAILROAD TRACK TOOLS.

FIG. 1347.



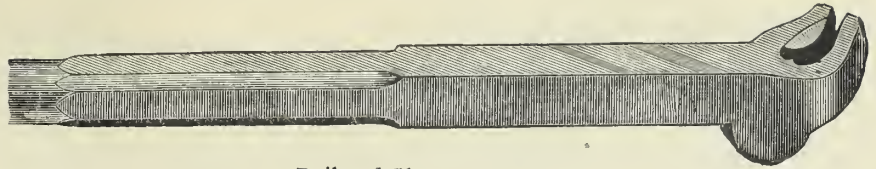
Railroad Sledge, Double Face. No. 57.

FIG. 1348.



Railroad Spike Maul. No. 47.

FIG. 1349.



Railroad Claw Bar. No. 66

FIG. 1350.



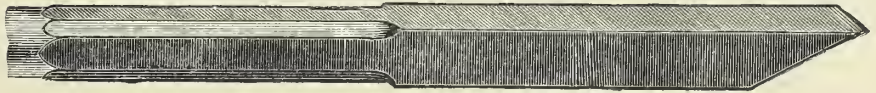
Railroad Tamping Bar. No. 65.

FIG. 1351.



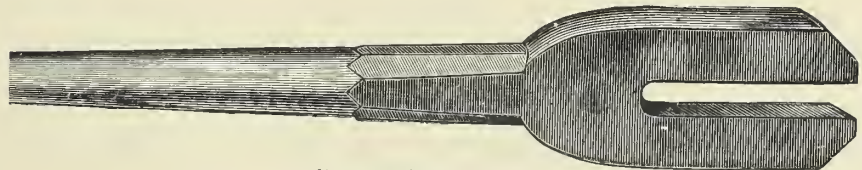
Crow Bar. Wedge Point. No. 63.

FIG. 1352.



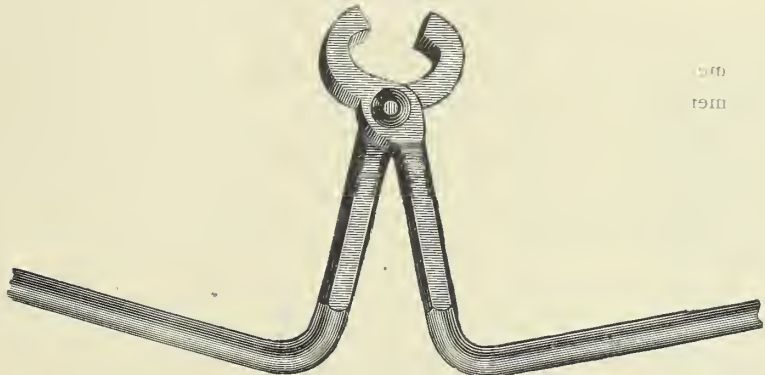
Crow Bar. Pinch Point. No. 64.

FIG. 1353.



Railroad Rail Fork. No. 61.

FIG. 1354.

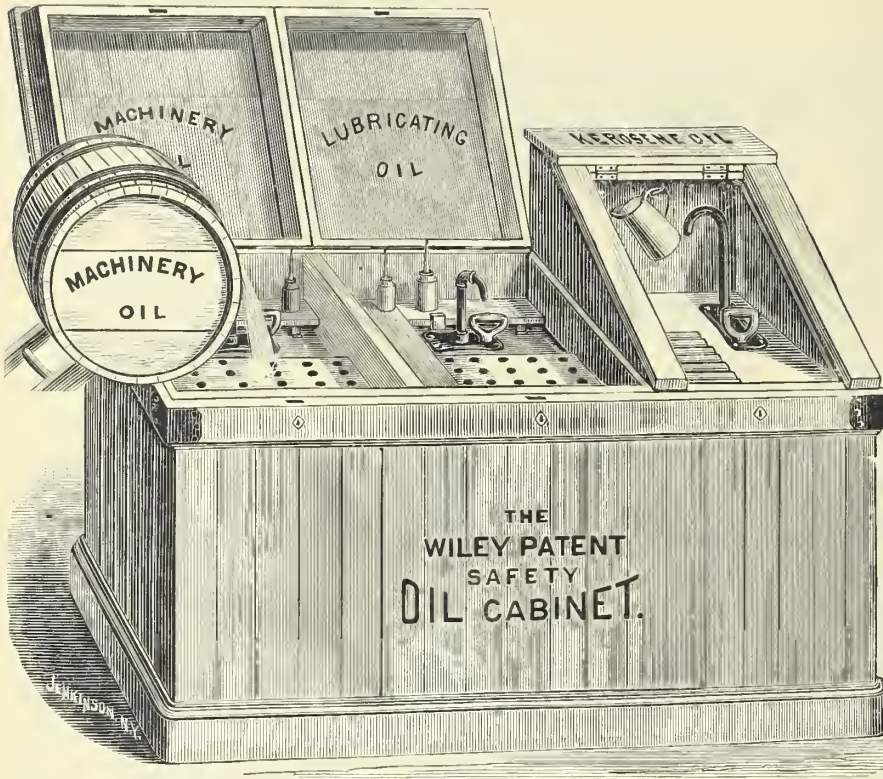


Railroad Rail Tongs. No. 62.

No.	Per lb.	No.	Per lb.
47 Steel spike maul, - - -	\$0 30	61 Steel rail fork, - - -	\$0 20
48 Steel track chisel, - - -	25	62 Steel rail tongs, - - -	20
57 Steel sledge, double faced, -	30	63 Steel crow bar, wedge point, -	8
58 Steel track punch, round point, -	25	64 Steel crow bar, pinch point, -	8
59 Steel track punch, square point, -	25	65 Steel tamping bar, - - -	10
60 Steel track wrench, - - -	14	66 Steel claw bar, - - -	12

THE WILEY PATENT SAFETY OIL CABINET.

FIG. 1355.



180 GALLON FACTORY OIL CABINET, WITH 3 COMPARTMENTS FOR 3 KINDS OF OIL.

The Wiley Patent Safety Oil Cabinet is constructed of matched lumber of good quality, bound with bands. A solid sheet of heavy lead resting upon a heavy board bottom, catches all the foreign substances in the oil, and holds them harmless. The sides are lined with heavy zinc.

The hydraulic seal attached to the waste-receiving orifice in the Wiley Cabinet prevents evaporation. In all other tanks or cans there is a great waste of oil by evaporation and other causes.

The oil is drawn and measured in the sink, and should there be any slop or dripping in measuring it goes directly back into the cabinet, and not a drop is lost. The gauge rod attached to our cabinet is of great importance, as you can at once detect any shortage. The Wiley Cabinet soon saves its price in oil, and its safety and convenience is invaluable.

Danger in case of fire is greatly lessened by the use of the Wiley Cabinet. The wood case and the zinc lining being both non-conductors of heat, gas is not generated, so that an explosion is impossible. Besides this, these materials keep the oil cool in the hottest weather, which is not the case with iron tanks. With a galvanized iron tank you have a double danger.

The galvanic action produced by a combination of zinc and iron sometimes leads to serious results. A gas is generated which, under certain conditions, will explode as quickly as the gas from oil.

This engraving shows how heavy oils may be run from the barrel into the cabinet, thus saving the pumping.

FACTORY, MACHINE SHOP, RAILROAD, BREWERY AND STEAMSHIP CABINETS.

PRICE LIST AND SIZES OF CABINETS COMPLETE. SUBJECT TO DISCOUNT.

The Factory Cabinets are all 39 inches high, Front and Back.

	Size in Inches.	Galls.	Price.
One compartment, 32 inches high, - - -	22 x 22	25	\$20 00
One compartment for one barrel, - - -	26 x 28	60	25 00
One compartment for two barrels, - - -	26 x 47	110	35 00
Two compartments for two barrels, - - -	26 x 52	120	45 00
One compartment for three barrels, - - -	26 x 66	160	40 00
Two compartments for three barrels, - - -	28 x 64	170	50 00
Three compartments for three barrels, - - -	26 x 76	180	60 00
One compartment for four barrels, - - -	30 x 73	210	45 00
Two compartments for four barrels, - - -	30 x 77	220	55 00
One compartment for five barrels, - - -	30 x 89	260	50 00
Two compartments for five barrels, - - -	30 x 94	270	60 00
Five compartments for five barrels, - - -	30 x 106	300	90 00

NOTE.—Each factory cabinet is supplied with a tin pump for pumping the oil from the barrel into the cabinet, or four feet of rubber tubing for syphoning the oil from the barrel into the cabinet, as preferred.

FIG. 1356.



60 GALLON FACTORY OIL CABINET.

WOODEN CASED CABINETS.

FIG. 1357.



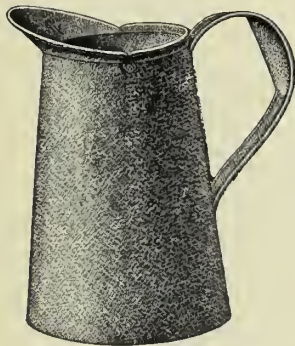
* Open and in use.

PRICE OF WOODEN CASED CABINETS,
Securely packed for shipping.

1	compartment, 60 gallons,	-	-	-	-	\$25 00
1	" 120 "	-	-	-	-	30 00
2	" 120 "	-	-	-	-	36 00
2	" 180 "	-	-	-	-	45 00
2	" 240 "	-	-	-	-	60 00

Movable pumps, gauge rods, rolling gear.

FIG. 1358.



STANDARD MEASURES.

No.	-	01	02	03
		1 Gill.	½ Pint.	1 Pint.
Per doz.	\$5 25	6 00	7 50	
No.	-	04	05	06
		1 Qt.	2 Qts.	4 Qts.
Per doz.	\$9 75	12 00	18 00	

Case lots, 01-03, 3 doz. of a size.

Case lots, 04-06, 2 doz. of a size.

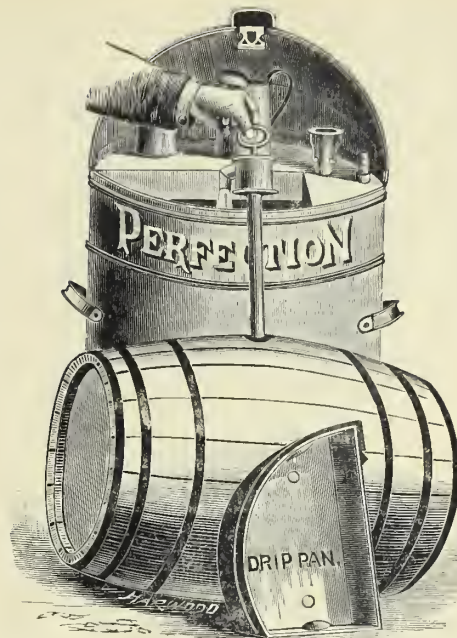
FIG. 1359.



FUNNELS.

No.	01	02	03	04	05	06
Capacity,	1 Gill.	½ Pint.	1 Pint.	1 Qt.	2 Qts.	4 Qts.
Per doz.	\$3 75	4 50	5 25	6 75	9 00	13 50
Each,						

FIG. 1360.



The process of transferring oil from the barrel to the tank.

PRICE OF PERFECTION TANKS,
Securely packed for shipping.

Capacity.	Price
No. 0, 6 gallons,	\$5 00
No. 00, 12 gallons,	6 00
No. 000, 25 gallons,	7 50
No. 1, 60 gallons,	12 00
No. 2, 100 gallons,	18 00
No. 3, 150 gallons,	24 00
No. 4, 200 gallons,	30 00
No. 5, 250 gallons,	33 00

EXTRAS.

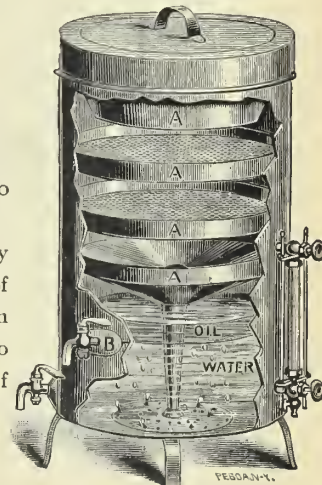
Set of measures (4) and funnel	\$1 50
Brass padlock and stop-cock for filling oilers,	1 25

FIG. 1361.

WASTE OIL FILTER AND PURIFIER.

Capacity, 15 gallons. Price, \$18 00

Is designed to filter and purify the drippings from all kinds of bearings, whether mixed with water or otherwise, as well as to more thoroughly cleanse new oil if so desired.



THE W. & B. TANK, OPEN AND IN USE.

FIG. 1362.



W. & B. TANKS.

Securely Packed for Shipping.

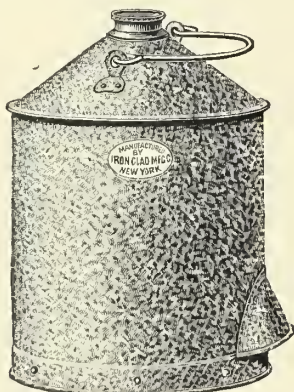
No.	o,	Capacity.					Price.
		6 Gallons,	-	-	-	-	\$5.00
"	00,	12 "	-	-	-	-	6.00
"	000,	25 "	-	-	-	-	7.50
"	1,	60 "	-	-	-	-	10.50
"	2,	120 "	-	-	-	-	16.50
"	3,	150 "	-	-	-	-	21.00
"	4,	200 "	-	-	-	-	24.00
"	5,	250 "	-	-	-	-	28.00

EXTRAS.

Set of measures (4) and funnel,	-	-	-	1.50
Brass padlock and stopcock for filling oilers,	-	-	-	1.25

N. Y. C. & H. R. R. R. PATTERN.

FIG. 1363.



GALVANIZED OIL CANS.

BRASS SCREW CAP.

No.	-	-	-	-	-	1	2	3	4
Diameter, Inches,	-	-	-	-	-	6 1/4	8	9	10 1/4
Height, body, inches,	-	-	-	-	-	7	9	10	12
Height, conetop, inches,	-	-	-	-	-	2 1/2	2 3/4	3	3 1/2
Gallons,	-	-	-	-	-	1	2	3	5
Each,	-	-	-	-	-	\$2.30	2.40	2.80	3.00

TANK OPEN AND IN USE.

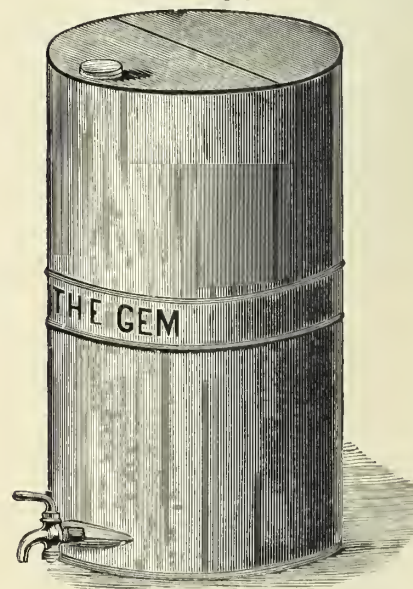
FIG. 1364.



THE STAR TANK.

32 Gallons,	-	-	-	-	-	-	Prices.
60 "	-	-	-	-	-	-	\$7.50
120 "	-	-	-	-	-	-	8.50
	-	-	-	-	-	-	15.50

FIG. 1365.



GEM TANKS.

Securely packed for shipping. For turpentine, varnish, heavy oils, etc. With either gate or faucet.

Size,	30 Gallons.	Price,	\$5.00	Size	250 Gallons.	Price,	\$25.00
"	60 "	"	6.50	"	300 "	"	30.00
"	120 "	"	14.00	"	500 "	"	40.00
"	180 "	"	20.00				

FIG. 1366.



XXXXX Tin Cylinder—No. 18 Gauge Steel
Bottom. Brass Cocks.

FIG. 1368.

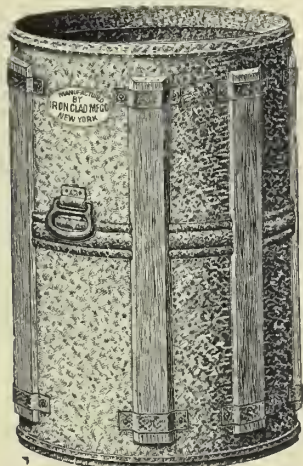


FIG. 1370.

**GALVANIZED STORING OIL CANS.**

Special sizes made to order.

No.	15	20	30	40	50	60	80	100
Inches,	14 x 24,	15 1/4 x 27,	18 1/2 x 28,	18 1/8 x 37,	18 1/8 x 45,	20 1/2 x 43,	22 1/2 x 48,	22 1/2 x 60
Gal.,	15	20	30	40	50	60	80	100
Each	\$6.25	7.00	8.00	9.00	9.25	10.50	11.50	13.50

TIN.

No.	15	20	30	40	50	60	80	100
Gallons,	15	20	30	40	50	60	80	100
Each,	\$5.00	5.75	6.75	7.75	8.00	9.25	10.25	12.25

Japanning tin cans, \$1.25 each, net.

GALVANIZED OIL WASTE CANS.

SELF-CLOSING COVER WITH IMPROVED SPRING ATTACHMENT.

The "Iron Clad" Oil Waste Cans are made without the use of solder and are galvanized after being put together. They are recommended by the leading insurance companies.

ROUND.

No.	1	No.	1
Inches,	11 1/4 x 15	Per dozen,	18.00

MADE TO ORDER ONLY—ROUND.

No.	2	3	4	5	6	7	8
Inches,	12x18	13x20	14x22	16x24	18x26	20x30	24x36
Dozen,	\$24.00	28.00	36.00	42.00	56.00	90.00	130.00

RECTANGULAR.

No.	30	40	50	60	70	80
Length, Ins.,	20	20	24	26	28	30
Width,	15	18	20	22	24	24
Depth,	20	24	30	30	34	36
Per Doz.,	\$70.00	90.00	132.00	140.00	170.00	190.00

GALVANIZED ASH CANS.

WITH EIGHT WOOD STRAPS.

No.	7	8	9	10
Inches,	15x26	17x26	18x26	20x26
Each,	\$5 25	6.00	6.25	7.25

COVERS.

No.	7	8	9	10
Price per Doz.	\$8.50	9.50	10.00	10.50

JAPANNED STEEL ASH CANS.

EXTRA HEAVY.

No.	20	30	40	50	60
Inches,	13x17	15x24	17x24	18x24	20x24
Each,	\$5.80	7.00	8.00	9.25	10.50

GALVANIZED ASH CANS.

WITH HEAVY BAIL FOR HOISTING.

No.	250	300	400	500	600
Inches,	14x19	15x26	17x26	18x26	20x26
Each,	\$5.50	6.50	7.25	7.50	8.50

WITH EIGHT WOOD STRAPS.

No.	70	80	90	100
Inches,	15x26	17x26	18x26	20x26
Each,	\$7.25	8.00	8.25	9.25

GALVANIZED ASH CANS.

"ELEVATED R.R." PATTERN.

Made of 16 gauge steel. Weight 40 pounds.

No.	-	-	-	-	150
Inches,	-	-	-	-	18x25
Each,	-	-	-	-	\$15.00

FIG. 1367.



FIG. 1369.

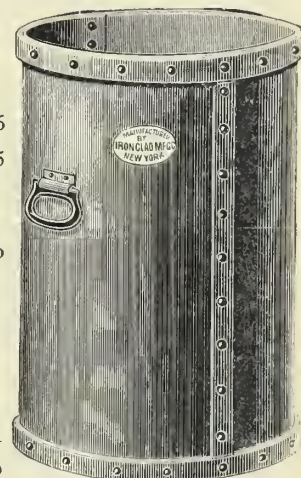
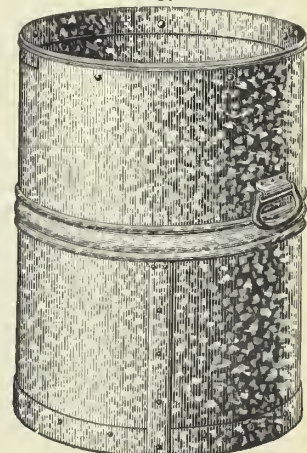
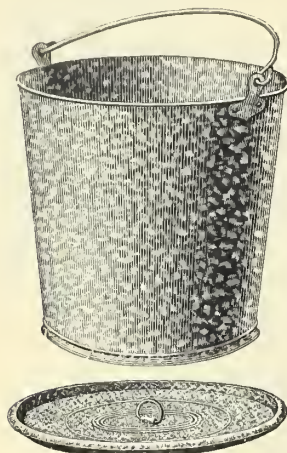


FIG. 1371.



GALVANIZED FIRE BUCKETS.

FIG. 1372.



No.	10	12	14	16
Quarts,	10	12	14	16
Per dozen,	4.50	5.00	5.50	7.50
Painted red, \$1.00 per dozen net extra.				
Covers for Galvanized Fire Buckets.				
No.	10	12	14	16
Per dozen,	2.00	2.25	2.50	3.00

GALVANIZED PAILS—HEAVY.

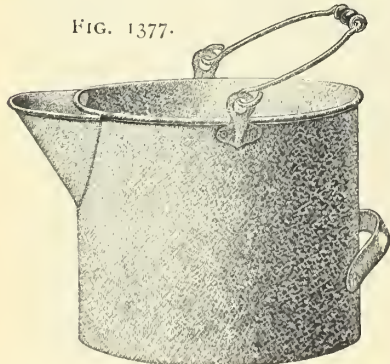
FIG. 1376.



No.	210	212	214	216	220
Quarts,	10	12	14	16	20
Per dozen,	5.50	6.00	6.25	7.50	16.00
Covers for Galvanized Pails.					
No.	210	212	214	216	220
Per dozen,	2.00	2.25	2.50	3.00	4.00

ENAMELED WATER PAILS—Lipped.

FIG. 1377.



No.	28	29	30	31
Quarts,	6	8	10	12
Inches,	8 x 8	8 1/4 x 8 3/4	9 1/2 x 9 1/2	10 1/2 x 10 1/2
Per dozen,	15.00	17.25	19.50	26.25

MALLEABLE IRON OILERS WITH AUTOMATIC SPRING BOTTOMS.

FIG. 1375.

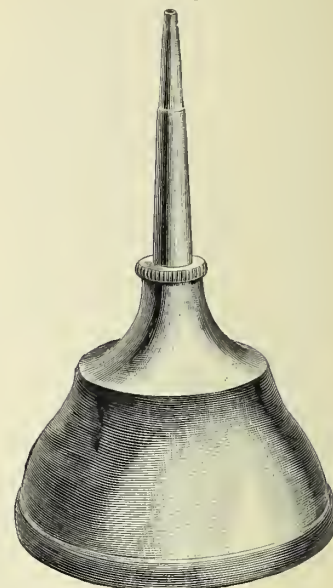


FIG. 1374.

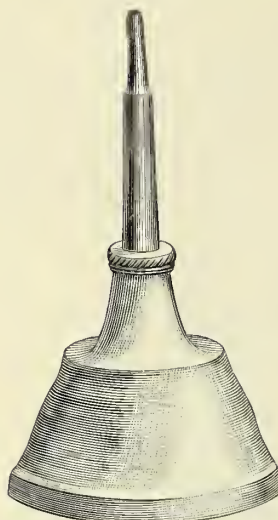
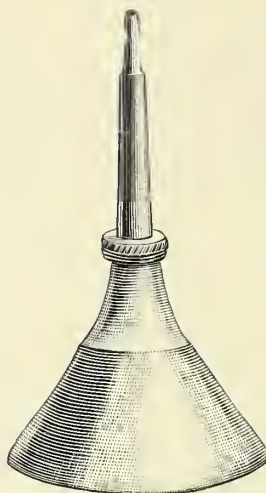


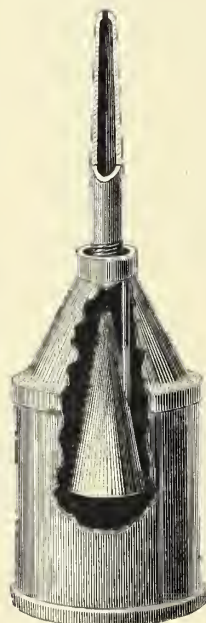
FIG. 1373.



No. 1.	Nos. 2 and 3 (Style).	No. 4 (Extra Large)
No. 1. Capacity 2 5/8 oz.,		per dozen, \$3 60
" 2 " 3 3/4 "		" 4 00
" 3 " 5 1/2 "		" 4 40
" 4 " 8 "		" 5 20
Extra tubes,		" 1 80

"THOMPSON" OILERS.

FIG. 1378.



O. K. OILERS, WIDE MOUTH. IMPROVED STYLE. AUTOMATIC SPRING BOTTOMS.

FIG. 1380.

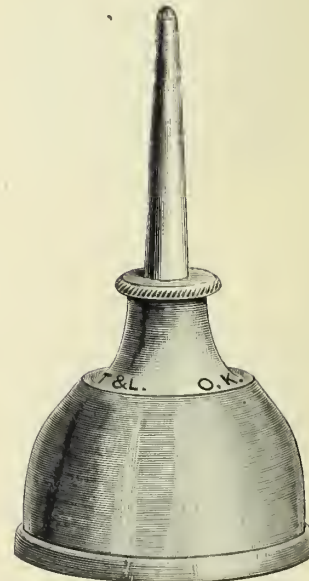
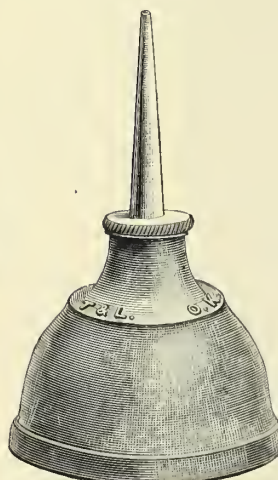


FIG. 1379.



O. K. No. 10

O. K. Nos. 20 and 30.

No.	Pints.	Height Inches	Per Gross
1	1/4	3 1/2	33.00
2	1/2	4 1/2	36.00
3	1	5 1/2	39.00

No. 1 Tubes always sent with oilers unless otherwise ordered.

No.	Per doz.	No.	Straight. Per doz.	Bent. Per doz.
10	\$5 40	10, 9 inch tubes,	\$7 00	\$7 25
20	6 00	20, 9 inch tubes,	7 50	7 75
30	6 60	30, 9 inch tubes,	8 00	8 25
Extra tubes,	1 80	Extra 9 inch tubes,	3 40	3 75
Capacity No. 10, 4 1/2 oz.		No. 20, 5 1/4 oz.		No. 30, 7 1/2 oz.

STEEL ANTI-RUST OILERS.

FIG. 1382.

FIG. 1383.

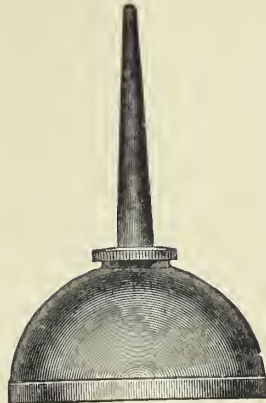
FIG. 1384.

FIG. 1385.

FIG. 1381.



No. 12.



No. 13.



No. 14.

FIG. 1386.



No. 15.

No. 16.

WITH IMPROVED CLOCK STEEL SPRING BOTTOMS.

No. 12.	Steel Oiler, 2 3/4 inch diameter, 2 1/2-inch nozzle,	-	-	-	per dozen, \$4 50
No. 13.	Steel Oiler, 3 3/8-inch diameter, 3-inch nozzle,	-	-	-	per dozen, 5 50
No. 13a.	Steel Oiler, 3 3/8-inch diameter, 5-inch nozzle,	-	-	-	per dozen, 6 00
No. 14.	Steel Oiler, 3 3/8-inch diameter, 9-inch nozzle,	-	-	-	per dozen, 6 50
No. 15.	Steel Oiler, 4 1/8 inch diameter, 3-inch nozzle,	-	-	-	per dozen, 9 25
No. 15a.	Steel Oiler, 4 1/8-inch diameter, 5-inch nozzle,	-	-	-	per dozen, 9 75
No. 16.	Steel Oiler, 4 1/8-inch diameter, 9-inch nozzle,	-	-	-	per dozen, 10 50
No. 120.	Nickel Plated Oilers, 2 3/4 inch diameter, 2 1/2-inch nozzle,	-	-	-	per dozen, 6 50
No. 130.	Nickel Plated Oilers, 3 3/8-inch diameter, 3-inch nozzle,	-	-	-	per dozen, 8 00
No. 130a.	Nickel-Plated Oilers, 3 3/8-inch diameter, 5-inch nozzle,	-	-	-	per dozen, 8 75
No. 140.	Nickel-Plated Oilers, 3 3/8-inch diameter, 9-inch nozzle,	-	-	-	per dozen, 9 20
No. 140a.	Nickel-Plated Oilers, 3 3/4-inch diameter, 3-inch nozzle,	-	-	-	per dozen, 10 00
No. 140aa.	Nickel Plated Oilers, 3 3/4-inch diameter, 5 inch nozzle,	-	-	-	per dozen, 10 75
No. 140b.	Nickel-Plated Oilers, 3 3/4-inch diameter, 9-inch nozzle,	-	-	-	per dozen, 11 25
No. 150.	Nickel-Plated Oilers, 4 1/8-inch diameter, 3-inch nozzle,	-	-	-	per dozen, 12 00
No. 150a.	Nickel-Plated Oilers, 4 1/8-inch diameter, 5-inch nozzle,	-	-	-	per dozen, 13 00
No. 160.	Nickel-Plated Oilers, 4 1/8-inch diameter, 9-inch nozzle,	-	-	-	per dozen, 14 00

These Oilers are Heavily Nickel-Plated on Electro Copper-Plate and highly polished.
All nozzles from 3 to 18 inches are interchangeable, and will fit any size oiler.

NICKEL-PLATED RAILROAD OILERS.

No. 10.	1-pint Railroad Oiler, 3 3/8-inch diameter, 5 inches high, 12-inch nozzle,	-	-	-	per dozen, \$14 00
No. 11.	1-quart Railroad Oiler, 4 1/8-inch diameter, 6 inches high, 18-inch nozzle,	-	-	-	per dozen, 18 00
No. 17.	1 pint Railroad Oiler, 3 3/8 inch diameter, 5 inches high, 12-inch nozzle,	-	-	-	per dozen, 18 00
No. 18.	1-quart Railroad Oiler, 4 1/8-inch diameter, 6 inches high, 18-inch nozzle,	-	-	-	per dozen, 21 00

These Railroad Oilers have seamless drawn bodies and are indestructible.
They are Heavily Nickel-Plated on Electro Copper-Plate and highly polished.

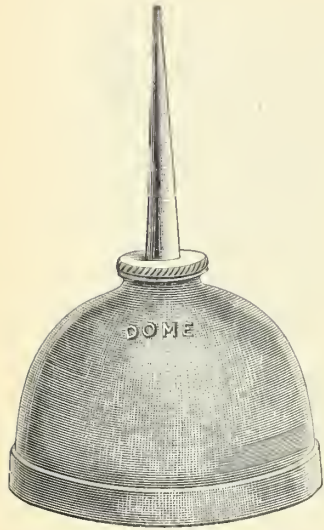
NICKEL PLATED RAILROAD OILERS.



MALLEABLE IRON OILERS.

NEW PATTERN. WIDE MOUTH. AUTOMATIC SPRING BOTTOM.

FIG. 1387.



Nos. 22 and 44.

Capacity of No. 22, - 5 ozs.
No. 44, very large, - 12 ozs.

PRICES.

No.		Per doz.
22,	- - - - -	\$5 60
44,	- - - - -	9 50
		Straight. Bent.
22, with 9-inch Tubes,	- - - - -	per dozen, \$7 25 \$7 50
44, with 9 inch Tubes,	- - - - -	per dozen, 11 00 11 25

STEEL ANTI-RUST RAILROAD OILERS.

These Oilers are made from two seamless drawn parts.

They are heavily Electro Copper-Plated Inside to prevent rusting and the oil from becoming gritty. The outside perfectly resembles burnished copper.

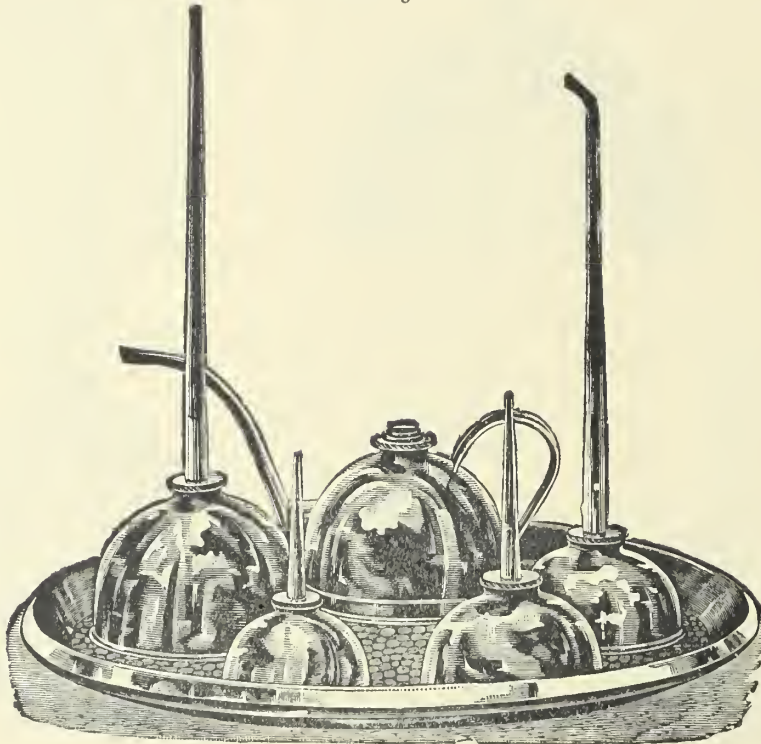
STEEL, ALSO NICKEL-PLATED TALLOW POTS.

No.		Per doz.
212.	1-qt. Copperized Steel Tallow Pots, 5-in. diam. 5-in. high,	\$21 00
213.	2-qt. Copperized Steel Tallow Pots, 6-in. diam. 6-in. high,	25 00
214.	1 qt. Nickel-Plated Tallow Pots, 5-in. diam. 5-in. high,	32 00
215.	2 qt. Nickel-Plated Tallow Pots, 6-in. diam. 6-in. high,	36 00

These Tallow Pots are made of very heavy stock, and have a large spout, $\frac{3}{8}$ -inch diameter, and 2-inch filling opening, with tapered metal plug attached to the handle by a chain. They are Heavily Electro Copper-Plated Inside to prevent rusting and the oil from becoming gritty.

ENGINEERS' SETS.

FIG. 1388.



ENGINEERS' SETS.

With Round and Oval Trays. Copperized, also Nickel-Plated.

WITH OVAL TRAY.

No. 35.	Five Pieces, Copperized Steel, (Counting Tray)	- - - - -	\$7 00
No. 45.	Six Pieces, Copperized Steel, (Counting Tray)	- - - - -	10 00
No. 55.	Five Pieces, Nickel-Plated, (Counting Tray)	- - - - -	8 00
No. 65.	Six Pieces, Nickel-Plated, (Counting Tray)	- - - - -	11 00

FIG. 1389.



WITH ROUND TRAY.

No. 30.	Five Pieces, Copperized Steel, (Counting Tray),	- - - - -	\$5 00
No. 40.	Six Pieces, Copperized Steel, (Counting Tray),	- - - - -	7 00
No. 50.	Five Pieces, Nickel-Plated, (Counting Tray),	- - - - -	7 00
No. 60.	Six Pieces, Nickel-Plated, (Counting Tray),	- - - - -	10 00

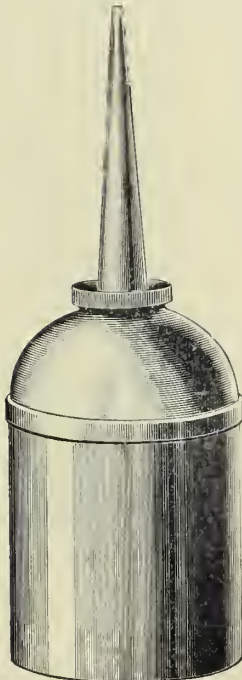
FIG. 1390.

STEEL, ALSO NICKEL-PLATED ENGINEERS' FILLERS.

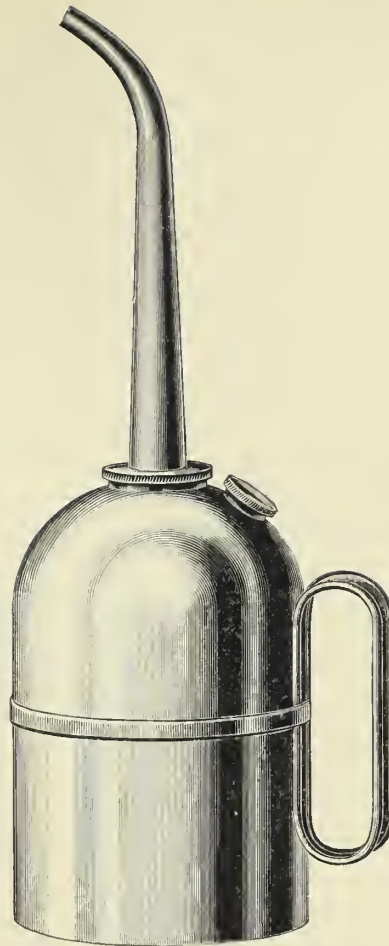
	Per doz.
No. 19. 1-pint Copperized Steel Fillers, 4 $\frac{1}{8}$ -inch diam., 3 $\frac{1}{2}$ -inch high, screw top, - - -	\$14 00
No. 19a. 1 $\frac{1}{2}$ -pt. Copperized Steel Fillers, 4 $\frac{3}{4}$ -inch diam., 4-inch high, screw top, - - -	17 00
No. 210. 1-quart Copperized Steel Fillers, 5-inch diameter, 5-inch high, screw top, - - -	20 00
No. 211. 2-quart Copperized Steel Fillers, 6-inch diameter, 6-inch high, screw top, - - -	24 00
No. 190. 1 $\frac{1}{2}$ -pint Nickel-Plated Fillers, 4 $\frac{3}{4}$ -inch diameter, 4-inch high, screw top, - - -	22 00
No. 200. 1-quart Nickel-Plated Fillers, 5-inch diameter, 5-inch high, screw top, - - -	30 00
No. 201. 2-quart Nickel-Plated Fillers, 6-inch diameter, 6-inch high, screw top, - - -	34 00

These Fillers are made of very heavy stock, and handsomely finished in both copperized steel and nickel-plated. They are heavily electro copper-plated inside to prevent rusting and the oil from becoming gritty.

FIG. 1391.



No. 1.



No. 111.

COPPERIZED STEEL ANTI-RUST RAILROAD OILERS.

	Per doz
No. 101. 1-quart Railroad Oiler, 4 $\frac{1}{8}$ -inch diameter, 6-inch high, 10-inch nozzle, - - -	\$18 00
No. 111. 2-quart Railroad Oiler, 5-inch diameter, 8-inch high, 10-inch or 14-inch nozzle, - - -	20 00

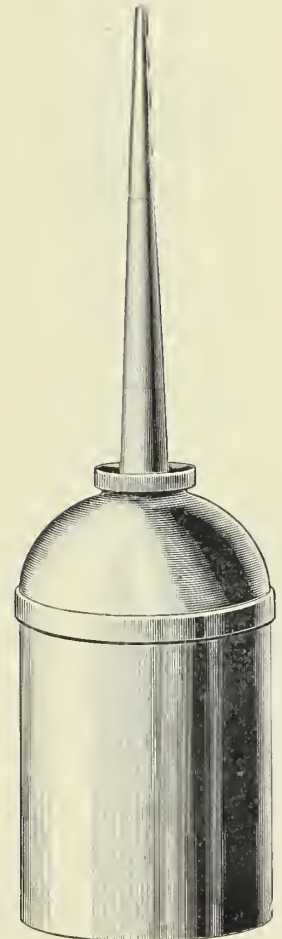
Smooth surface, cold rolled, No. 20 gauge "Swedoh" Steel is used in the manufacture of all our oilers. They are heavily electro copper-plated inside to prevent rusting and the oil from becoming gritty.

The outside perfectly resembles burnished copper.

These Oilers are of the standard size and pattern used on all railroads, and are especially adapted for locomotive and stationary engines. They are made from two seamless drawn parts, with large nozzle 1 $\frac{1}{2}$ inch diameter at base, 10 inches and 14 inches long.

Always order by number.

FIG. 1392.



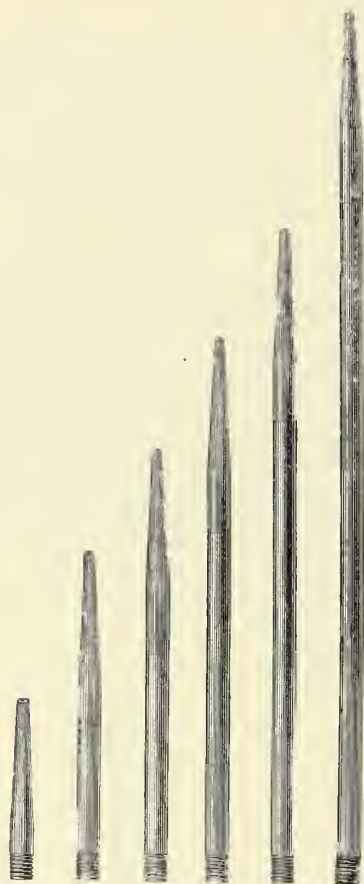
No. 2.

THE NEW COPPERIZED SEAMLESS STEEL ANTI-RUST TEXTILE MILL SIPHON OILERS.

With Finely Hardened and Tempered Steel Nozzles.

	Per gross.
No. 1. 4 $\frac{1}{2}$ -inch high, 2 $\frac{1}{2}$ -inch diam, 3-inch nozzle, - - -	\$48 00
No. 2. 5-inch high, 2 $\frac{1}{4}$ -inch diam., 5-inch nozzle, - - -	52 00

FIG. 1393.



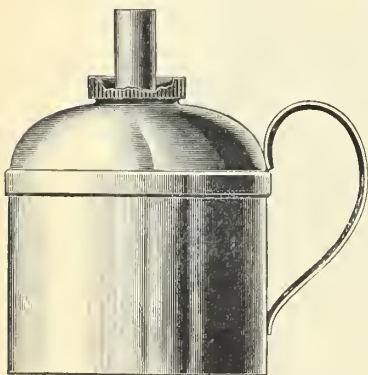
Nos. 16, 17, 18, 19, 20, 21 or 22 Wire Gauge Bore.

Nos. 18 and 19 are the Regular Sizes.

Nos.	1	2	3	4	5	6
Inches,	3½	6	8	10	12	16
Per Gross,	\$12.00	16.00	24.00	30.00	40.00	48.00

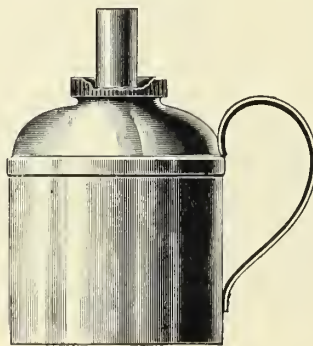
SEAMLESS STEEL, ALSO NICKEL-PLATED LAMPS.

FIG. 1395.



No. 22. COPPERIZED.

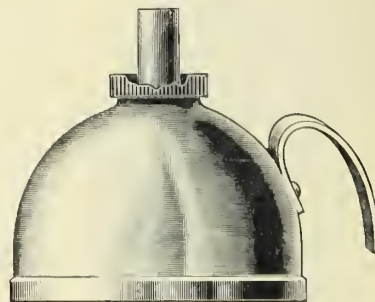
FIG. 1396.



No. 23. COPPERIZED.

STEEL ANTI-RUST JACKET LAMPS.

FIG. 1397.



COPPERIZED.

Always Order by Number.						
No. 22.	Copperized Steel,	3¼ inch diameter,	-	-	-	\$9.00
No. 23.	Copperized Steel,	4 inch diameter,	-	-	-	12.00
No. 220.	Nickel-Plated,	3¼ inch diameter,	-	-	-	12.00
No. 230.	Nickel-Plated,	4 inch diameter,	-	-	-	15.00

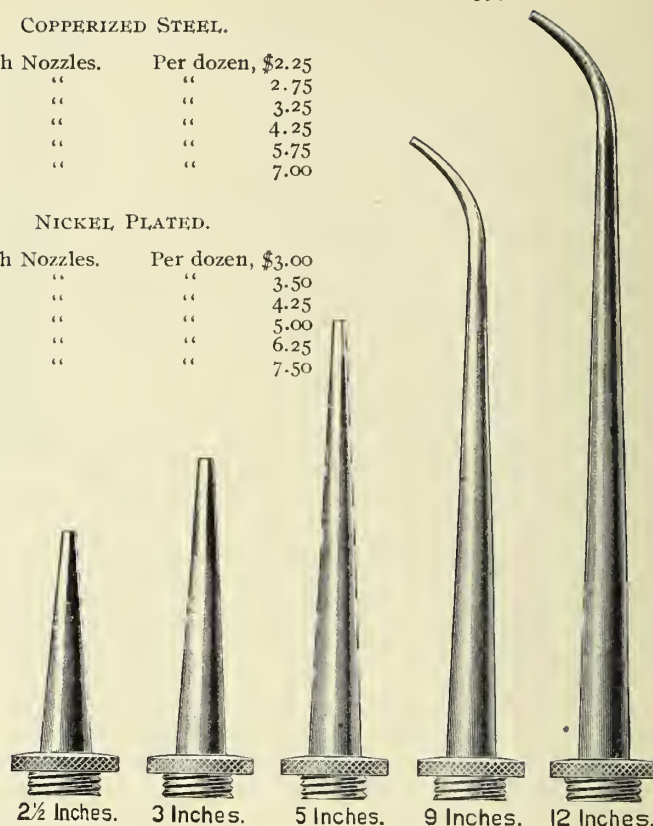
COPPERIZED STEEL.

2½ inch Nozzles.	Per dozen, \$
2½ " "	2.25
3 " "	2.75
5 " "	3.25
9 " "	4.25
12 " "	5.75
18 " "	7.00

NICKEL PLATED.

2½ inch Nozzles.	Per dozen, \$
2½ " "	3.50
3 " "	4.25
5 " "	5.00
9 " "	6.25
18 " "	7.50

FIG. 1394.



All nozzles heavily electro copper plated inside to prevent rusting and the oil from becoming gritty.

Nozzles 3 to 18 inches are interchangeable and fit any size Oilers. We furnish straight nozzles 9 to 18 inches same list as bent.

HEAD LIGHTS.



FIG. 1398.

STANDARD HEAD LIGHTS.

23 inch Signal Number. Also made without signal number in the following sizes :
23 inch, 20 inch, 18 inch, 16 inch.

Prices on application.



FIG. 1399.

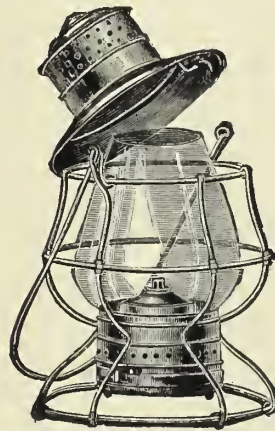
ROUND HEAD LIGHT.

Made in 18, 16 and 14 inches.

Prices on application.

RAILROAD LANTERNS.

FIG. 1401.



Wire Bottom.

No. 39 SINGLE AND DOUBLE GUARD RAILROAD LANTERN.

Standard size. Burns lard oil.

The cut shows the single guard lantern. The double guard has an additional wire around the lantern, and is consequently stronger.

Made in tin, brass and nickel-plated.

Bail fastened to the guard.

The bails are made so that when the lantern is put down the bail stands up.

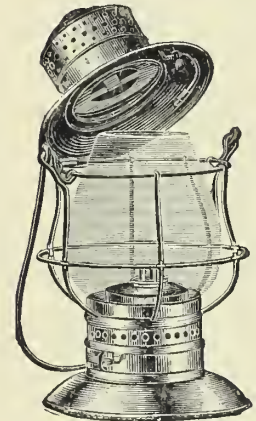
Hinged top and removable globe.

PRICES.

Tin,	-	-	-	each,	\$0.80
Brass,	-	-	-	"	2.50
Brass, nickel plated,	-	-	-	"	3.00

Wire bottom, same prices as No. 39.

FIG. 1402.



Standard Railroad.

WHITE GLOBES.

No. 0, Tubular globes,	-	per doz.,	\$0.60
" 0, Tubular globes, flint glass,	"	"	1.60
" 0, Tubular globes, bulls-eye,	"	"	1.10
" 39, Railroad globes,	-	"	.87
" 39, Railroad bulls-eye globe,	"	"	1.20

COLORLED GLOBES.

No. 0, Ruby tubular globes,	per doz.,	\$2.25
" 0, Blue or green tubular globes,	"	2.25
" 0, Ruby tubular globes,	-	"
Corning,	-	7.75
" 1, Ruby tubular globes,	-	"
Corning,	-	8.50
" 1, Blue or green globes,	-	"
Corning,	-	6.25
" 39, Ruby globes, Corning,	"	8.00
" 39, Blue or green,	"	5.50

WICKS

No. 00, Wicks, 1/4 inch,	per gross,	\$0.50
" 3, " 3/8 " - - -	"	.50
" 1, " 5/8 " - - -	"	.70
" 2, " 1 " - - -	"	1.00
" 3, " 1 1/2 " - - -	"	1.60

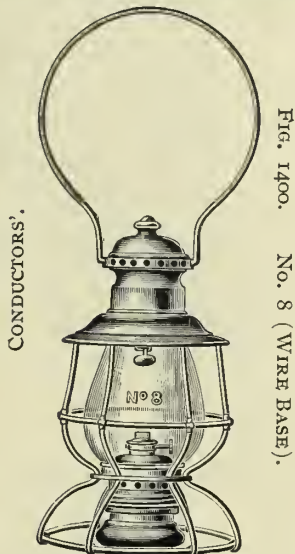


FIG. 1400.

No. 8 (WIRE BASE).

Nos. 3 AND 8 CONDUCTORS' LANTERNS.

3/8 inch ratchet burner. Burns lard oil.

The cut shows the No. 8. The No. 3 lantern is the same as No. 8, except that it takes a little smaller globe, has a solid bottom, and is lighter weight. Finely finished brass and nickel plated (also gold and silver-plated). Hinged top. Globe removable. Furnished with half ruby, green or blue, or plain flint globe.

No. 3, brass, \$4.00 each; nickel-plated, \$4.50 each; silver-plated, \$11.00 each; gold-plated, \$27.00.

No. 8, brass, \$4.50 each; nickel-plated, \$5.00 each; silver-plated, \$11.50 each; gold-plated, \$30.00 each.

Add for half green or half blue globes, \$1.50; half ruby, \$2.00 each. Add for engraving name on globe, \$1.00; name with wreath, \$1.50.

FIG. 1403.



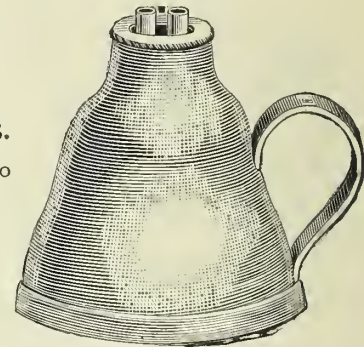
BLACK ENAMELED SEAMLESS STEEL YARD, MILL, MINE AND FOUNDRY LAMPS.

WITH NICKEL-PLATED TRIMMINGS, STRONG AND DURABLE.

For both hand use and hanging—the light is thrown in all directions and leaves no shadow below the lamp. Always order by number.

No. 24.	Steel,	1 quart,	2 burners	(located on thirds),	per dozen,	\$22.00
" 25.	"	1 "	3 "	"	quarters, "	25.00
" 26.	"	2 "	2 "	"	thirds, "	27.00
" 27.	"	2 "	3 "	"	quarters, "	30.00

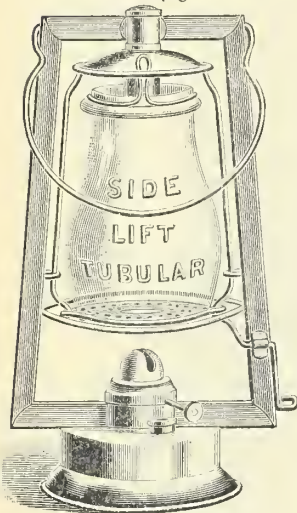
FIG. 1404.



MALLEABLE IRON HAND LAMPS.

Price, per dozen, - - - \$5.50

FIG. 1405



SIDE LIFT OR VICTOR TUBULAR LANTERN.

No. 1 burner. $\frac{5}{8}$ inch wick. No. 0 globe.

The crank at the side raises and lowers the globe and locks the burner in place when down.

A late improvement on this lantern consists of a bend on the guard wire over which the crank moves thus perfectly, locking the globe frame and burner down.

Price, 60 cents each.

No. 1 B SIDE LIFT TUBULAR LANTERN.

No. 2 burner. 1 inch wick. No. 0 globe.

This Lantern has the No. 2 burner, 1 inch wick.

The oil pot holds $1\frac{1}{4}$ pints of oil, and the lantern will burn 19 hours without refilling.

Price, 80 cents each.

FIG. 1406.

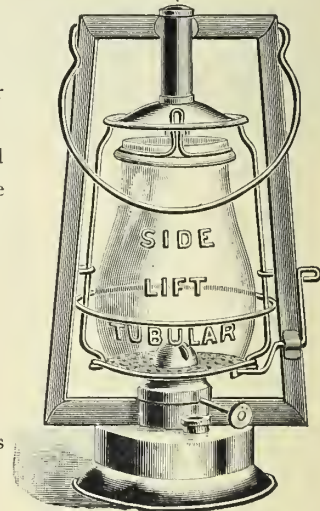
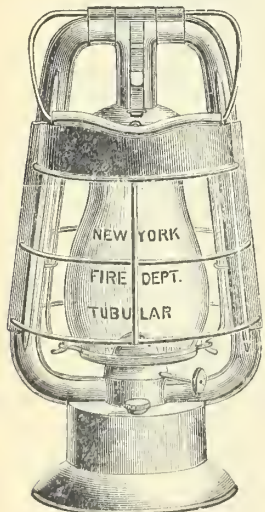


FIG. 1407.



ROUND TUBE TUBULAR FIRE DEPARTMENT LANTERN.

No. 1 burner. $\frac{5}{8}$ inch wick. No. 0 flint globe.

The Fire Department Lanterns have all latest improvements. Made extra heavy, with large double oil pots.

Fitted with patent wind break guard. Can be fitted with patent B. E. lens on the perforated plate—white, red, blue, yellow or green.

PRICES.

Tin, each,	-	-	\$2.00	Brass, each,	-	-	\$3.50
With copper oil pot,	-	-	2.50	Brass, nickel plated,	-	-	4.00
Fitted with white or colored B. E. lens, extra each,	-	-	-	-	-	-	.25

U. S. BRASS AND NICKEL PLATED TUBULAR LANTERN.

No. 0 burner. $\frac{3}{8}$ inch wick. U. S. globe. Smallest tubular lantern made.

Brass, each,	-	-	-	-	-	-	\$1.00
" nickel plated,	-	-	-	-	-	-	1.25

IRON CLAD TUBULAR LANTERN,

No. 1 burner. $\frac{5}{8}$ inch wick. No. 0 globe. The strongest Tubular Lantern made. In addition to having patent braces, it has an iron bottom, making it indestructible; largely used by contractors. Price, 90 cents each.

FIG. 1408.

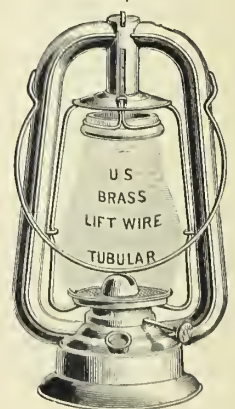


FIG. 1409.

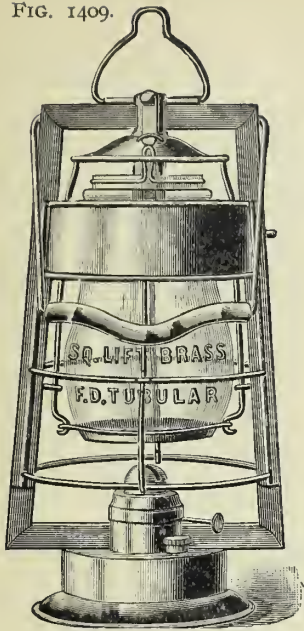
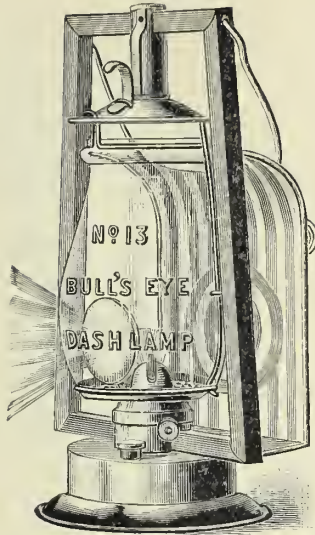


FIG. 1410.



SQUARE LIFT BRASS TUBULAR FIRE DEPARTMENT LANTERN.

No. 1 Burner. $\frac{5}{8}$ inch Wick. No. 0 Globe.

This is a good strong lantern, made of heavy brass and fitted with patent wind break guard.

Can be fitted with patent bull's eye lens on the perforated plate—white, red, blue, yellow or green.

Brass,	- - - - -	each,	\$2 50
Nickel plated,	- - - - -	"	3 00
Fitted with white or colored bulls eye lens,	- extra,	"	25

No. 13 TUBULAR SIDE AND DASH LAMP.

No. 1 Burner. $\frac{5}{8}$ inch Wick. No. 0 Globe.

Lamp finished with new bull's eye lens, can be fastened with Coulter or Warner holder.

Price,	- - - - -	90c. each.
Coulter or Warner holder,	- - - - -	25c. "

Nos. 2 AND 3 GLOBE TUBULER SIDE LAMP.

Can be used as a hanging lamp or side light. No. 3 can be regulated to burn a certain number of hours. No. 3 has our automatic extinguisher. No chimney. New globe lifter. Improved burner. Outside wick regulator.

No. 2 has No. 2 burner. 1 inch wick. No. 2 globe. 8 inch silvered glass reflector.

No. 3 has No. 3 burner. $1\frac{1}{2}$ inch wick. No. 3 globe. 10 inch silvered glass reflector.

No. 3,	- - - - -	each,	\$5 00
" 3, with our new glass fount, same as crystal street lamp,	- - - - -	"	5 25
" 2,	- - - - -	"	4 00

No. 3 GLOBE TUBULAR STREET LAMP.

No. 3 Burner, $1\frac{1}{2}$ inch wick. 3 inch flame. Will not blow out in the strongest wind. Automatic extinguisher. Can be regulated to burn a certain number of hours. Warranted to give satisfaction. 27 inches high.

No. 3 Globe Tubular Street Lamp, painted green. Iron brackets, japanned black. Tubular globes. Tubular burners. Prices on application.

FIG. 1413.

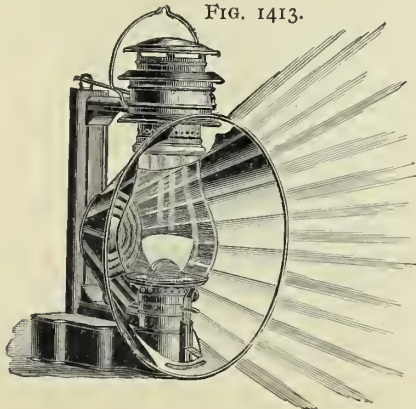
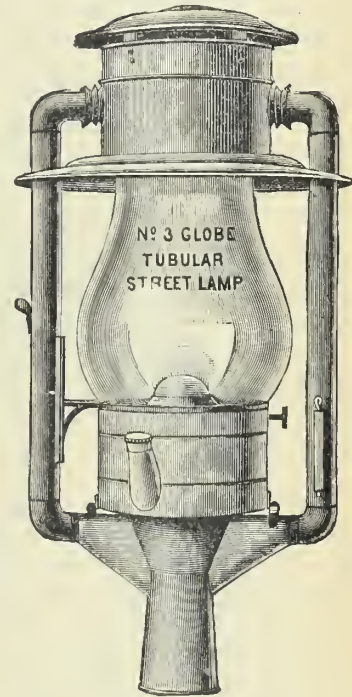


FIG. 1411.



FIG. 1412.



REVOLVING SEARCH LIGHT.

For outdoor or indoor use. Will not blow out. Reflector can be revolved so as to throw the volume of light in any desired direction.

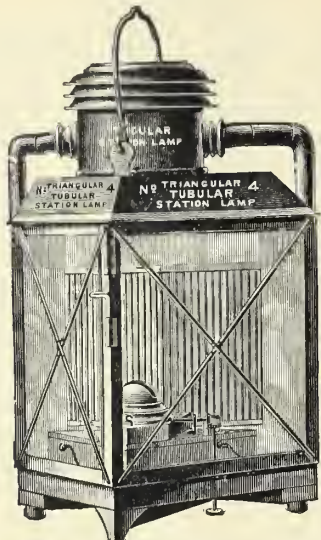
No. 30.—No. 2 Burner, 1 inch wick, No. 0 globe.

No. 60.—No. 3 Burner, $1\frac{1}{2}$ inch wick, No. 2 globe.

No. ,	- - - - -	each,	\$2 50
" 60,	- - - - -	"	6 00

No. 4 TUBULAR TRIANGULAR LAMP.

FIG. 1414.



No. 3 Burner. $1\frac{1}{2}$ inch Wick. 3 inch Flame.

No chimney. Improved burner.

Flame regulated from the outside. Brilliant light.

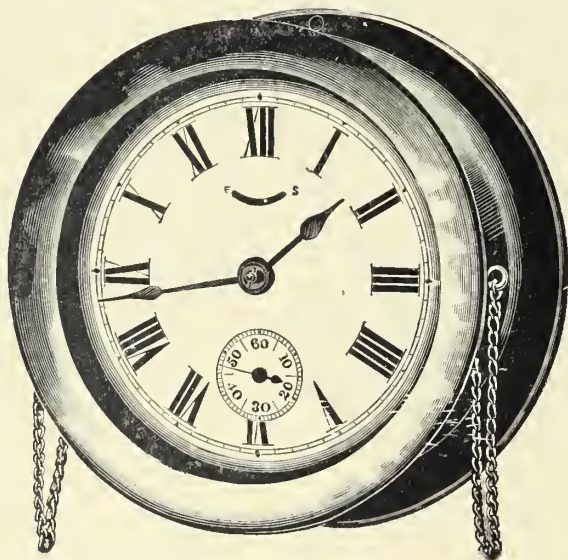
Will not blow out in the strongest wind.

Reflector arranged to throw light in three different directions.

$21\frac{3}{4}$ inches high. Price, \$6.00 each.

NAVY LEVER.

FIG. 1416.



CAST METAL CASE, BRASS OR NICKEL PLATED.

1 Day, Time. 6 inch Silvered Dial.

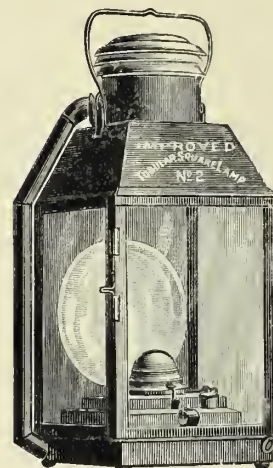
Movement winds through side of case, and has jeweled escape-ment. Snap bezel fitted with safety chains to prevent breakage if bezel slips out of hand while being removed.

Front measurement, 7 inches. Back measurement, $7\frac{3}{4}$ inches.

Price, - - - \$15.00.

IMPROVED TUBULAR SQUARE LAMP.

FIG. 1415.



Three Sizes, Nos. 1, 2 and 3.

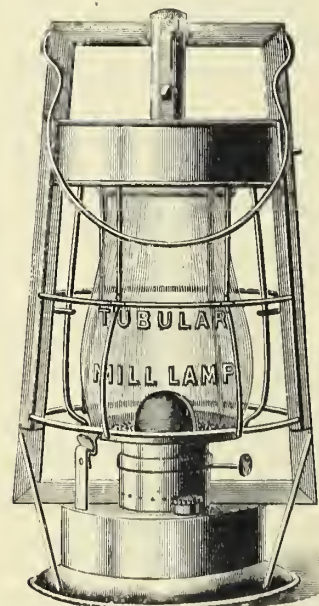
No.		
1,	No. 2 burner.	1 inch wick. 6 inch silvered glass reflector
2,	No. 3 burner.	$1\frac{1}{2}$ inch wick. 8 inch silvered glass reflector
3,	No. 3 burner.	$1\frac{1}{2}$ inch wick. 12 inch silvered glass reflector

No chimney. Improved burner. Does not smoke. Outside wick regulator. Will not blow out in the strongest wind. Brilliant light.

No. 1,	19 inches high.	Each,	-	-	\$4.00
No. 2,	$21\frac{1}{2}$ inches high.	Each,	-	-	5.00
No. 3,	26 inches high.	Each,	-	-	.00

SAFETY TUBULAR MILL LANTERN.

FIG. 1417.



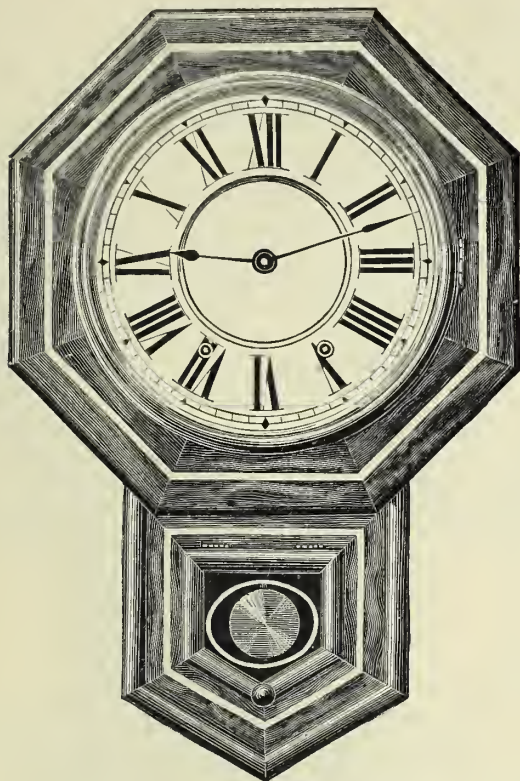
No. 2 Burner. 1 inch Wick. No. 0 Globe.

Price, - - - \$1.50

10 INCH DROP OCTAGON, GILT.

Rosewood or Walnut Veneer, Polished.

FIG. 1418.

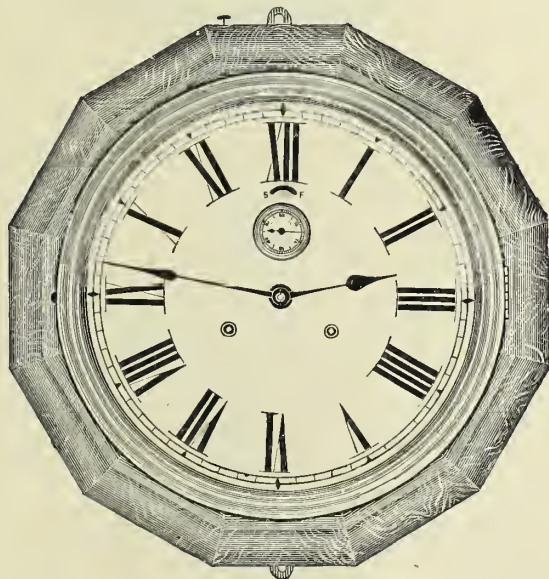


8 Day, spring time. 8 Day, spring, strike. Height, 21½ inches.
10 inch dial. Price, \$6.80.

LEVER.

Wood Case, Rosewood or Walnut Veneer, Polished.

FIG. 1420.

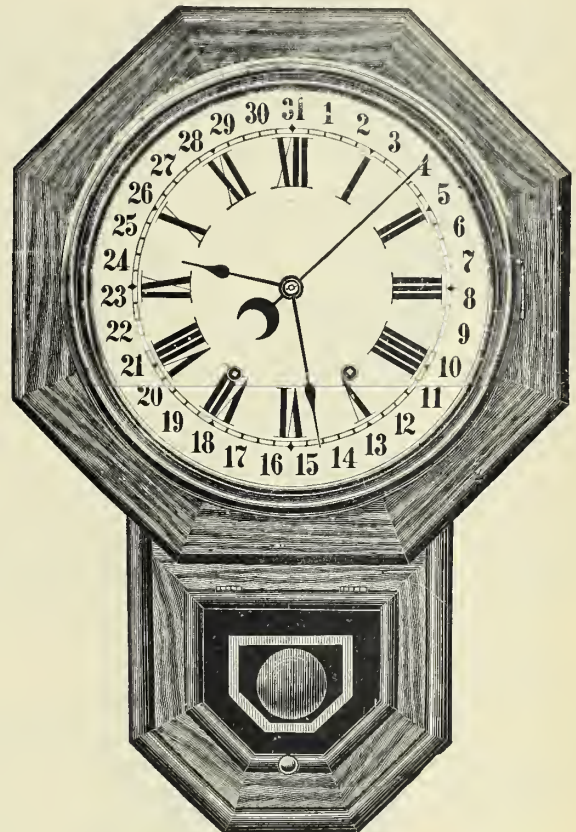


1 Day, 10 inch, time, \$4 90	8 Day, 12 inch, time, \$7 90
1 Day, 10 inch, strike, 5 50	8 Day, 10 inch, strike, 8 25
8 Day, 10 inch, time, 6 75	8 Day, 12 inch, strike, 9 40

DROP OCTAGON, CALENDAR.

Rosewood or Walnut Veneer, Polished.

FIG. 1419.

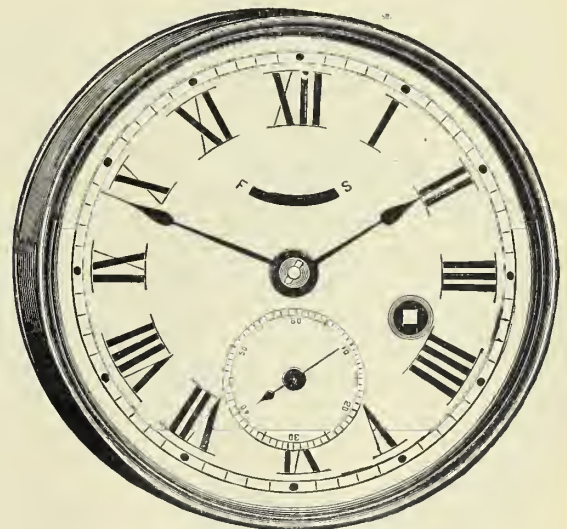


8 Day, spring, strike. 12 inch dial. Height, 23½ inches.
Price, \$8 00.

ENGINE LEVER.

Metal Case, Brass or Nickel Plated.

FIG. 1421.

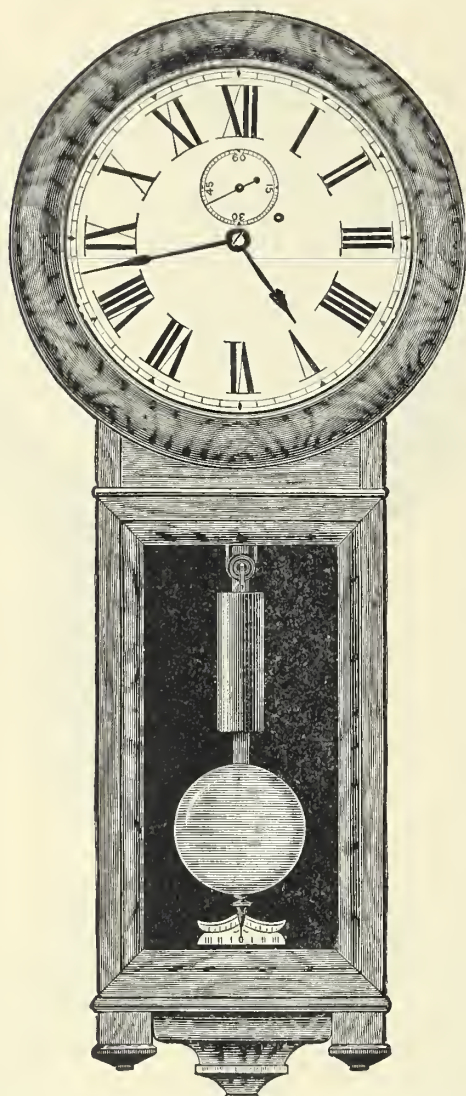


1 Day time. 8 Day, time. 6 inch dial. Price, \$3 75.

REGULATOR No. 2.

WALNUT, CHERRY, OAK OR OLD OAK VENEER, POLISHED.

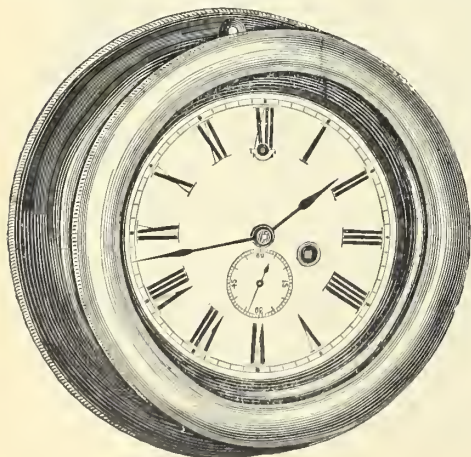
FIG. 1422.



8 Day, Weight, Time. Height, 34 inches. 12 inch Dial.

Movement, $2\frac{1}{2} \times 4\frac{1}{4}$ inches, lantern pinions, Graham pallets, brass covered zinc ball, and wood rod. Eighty beats to the minute. Movement has retaining power. Price, \$16.50.

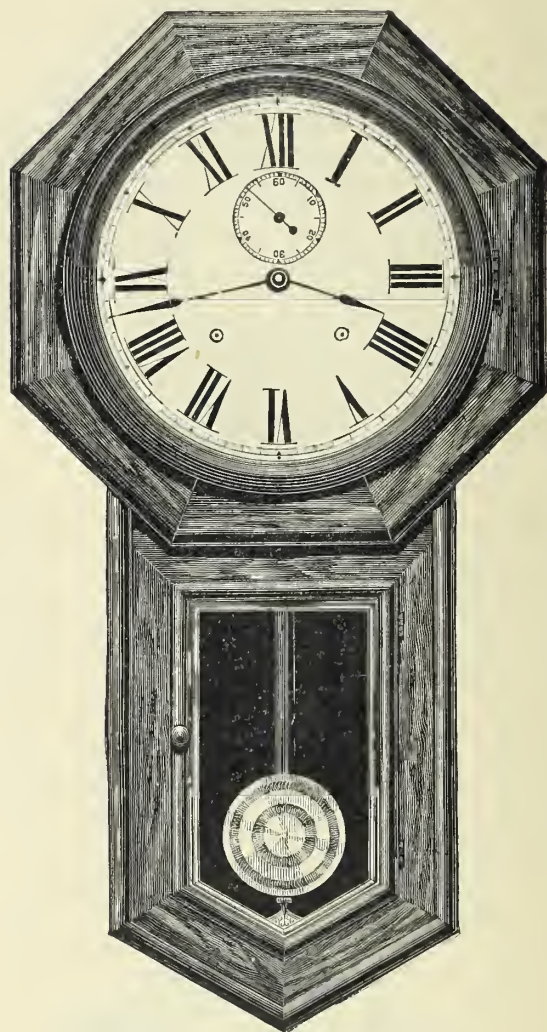
FIG. 1424.



WORLD.

ROSEWOOD, WALNUT OR OLD OAK VENEER.

FIG. 1423.



15 Day, Spring, Time. Price, \$10.50.

8 Day, Spring, Strike, Cathedral Bell. Price, \$12.00.

Height, 32 inches. 12 inch Dial.

CHRONOMETER LEVER.

PORCELAIN DIAL.

1 Day, No. 5003, $3\frac{1}{2}$ in. Dial. 1 Day, No. 5004, $4\frac{1}{2}$ in. Dial. 1 Day, No. 5006, $4\frac{1}{2}$ in. Dial.

We call attention to this Fine Lever Clock, specially designed for Locomotive, Steamers, or other situations where accurate time-keeping is required, and a pendulum clock cannot be used.

The movements are made in the best manner, with steel pinions and chronometer balance, jeweled, and are fitted up with finely tempered hair springs.

They have a very simple and perfect regulator, which provides for the most accurate adjustment.

They are put up in three sizes of cast brass cases, with porcelain dials:

Diameter of No. 5003 at front, $5\frac{1}{2}$ inches; at back, $6\frac{1}{2}$ inches.

Diameter of No. 5004 at front, $6\frac{1}{2}$ inches; at back, $7\frac{1}{2}$ inches.

Diameter of No. 5006 at front, $6\frac{3}{4}$ inches; at back, $8\frac{1}{2}$ inches.

Nos. 5003 and 5004 have snap bezels. The front of 5006 is screwed on, and the winding is at the side of case. No. 5006 is dust proof.

These clocks are warranted accurate time keepers.

Prices on Application.

RAILWAY LOCKS.

FIG. 1425.

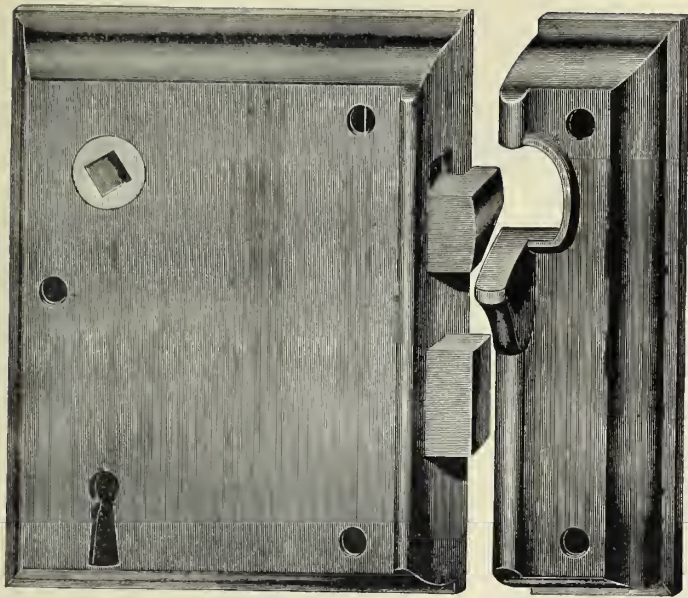
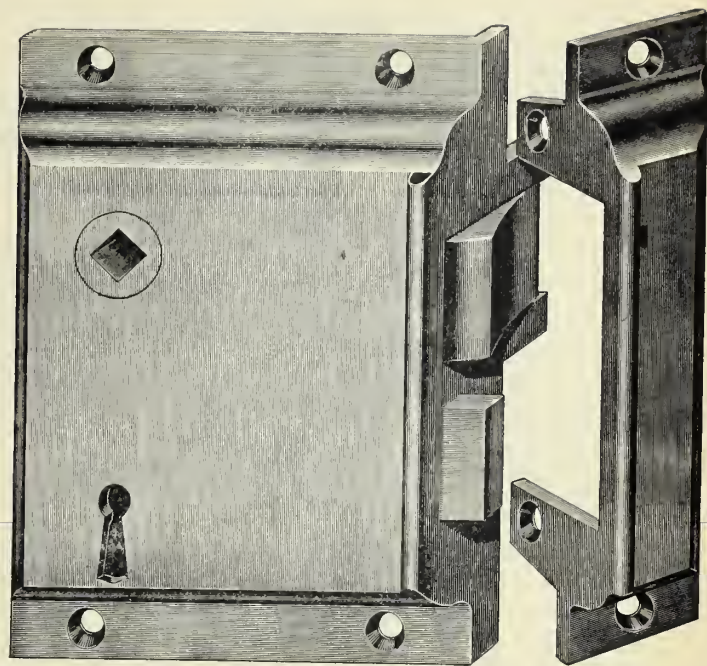
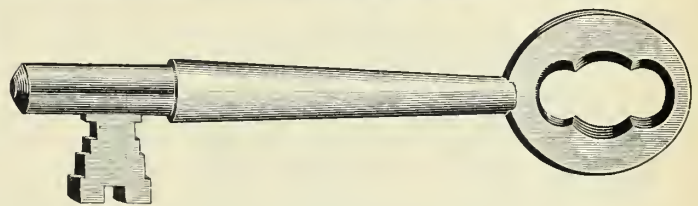


FIG. 1426.

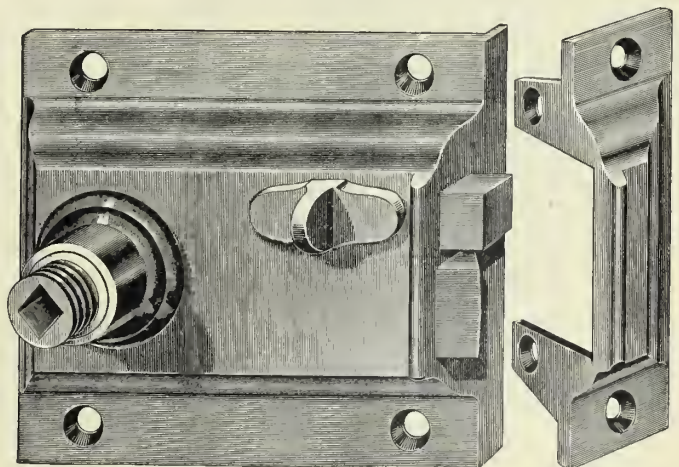
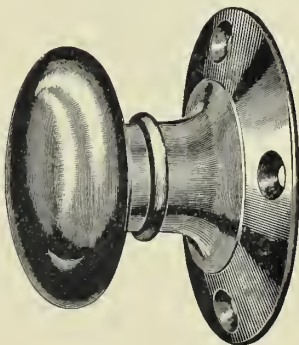


Caboose Lock, No. 93.



Coach Lock, No. 83.

FIG. 1427.

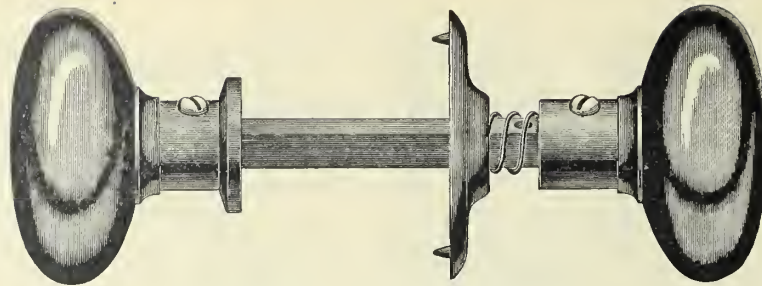


Saloon Latch, No. 15.

Cuts Nos. 15, 83, 93, two-thirds of actual size.

BRONZE METAL COACH KNOBS.

FIG. 1428.



No. 225 Knob. (Cut $\frac{2}{3}$ actual size.)

Caboose Lock, No. 93, is of iron with black enamel case. The latch bolt is a spring bolt. The locking bolt is operated by a key, and the lock can be made to fit any key of this style furnished. Springs used are flat tempered steel.

Coach Lock, No. 83, is of bronze metal, except the latch bolt, which is of iron blued. The lock is polished all over. It is a tumbler lock with bronze locking bolt. Hub made to fit regulation size of spindle, or to order to fit any size of spindle. Latch bolt is so shaped as to operate practically as an anti-friction bolt. It is a pivoted bolt. Brass locking bolt made to fit any standard key of this style furnished.

Saloon Latch, No. 15, is of bronze metal with thumb slide on one side to operate the locking bolt, and key-hole on the other side. The latch bolt is made so as to operate on the anti-friction order, and the whole lock is highly polished. Made to fit any standard key of this style, furnished.

Knobs, No. 225, are of all bronze metal with standard size spindle. Spring arrangement for taking up any lost motion between the knob and the rose. Knobs are highly polished and lacquered. Prices are as follows:

No. 93,	Caboose lock,	-	-	-	-	-	-	per dozen,	\$6 00
No. 83,	Coach lock,	-	-	-	-	-	-	"	33 00
No. 15,	Saloon latch,	-	-	-	-	-	-	"	21 00
No. 225,	Knobs,	-	-	-	-	-	-	per dozen pairs,	6 75

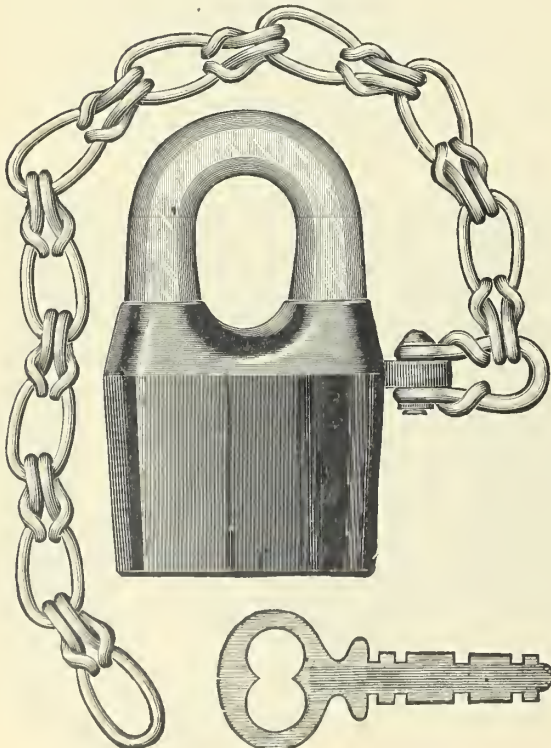
SWITCH LOCKS.

No. 1,	-	-	-	-	-	-	-	per dozen,	\$9 50
No. 3,	-	-	-	-	-	-	-	"	10 00
No. 7,	-	-	-	-	-	-	-	"	9 60

Prices quoted without keys.

No. 1635,	12 keyed,	-	-	-	-	-	-	per dozen,	\$10 00
No. 1635,	24 keyed,	-	-	-	-	-	-	"	11 30

FIG. 1429.



SPRING SELF-LOCKING SCANDINAVIAN LOCK.

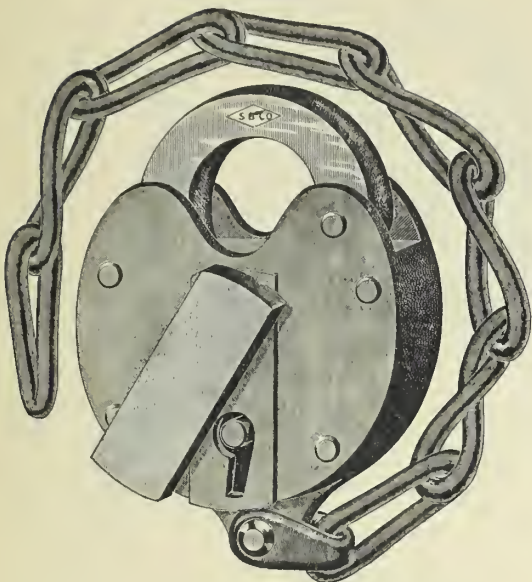
All malleable iron and steel. Patented vertical tumblers. Polished case, black enameled. Nickel-plated, polished shackle. Oil-tempered steel springs. Brass key-hole cylinder. Flat steel keys. Two keyed.

No. 21,	-	-	-	-	per doz.,	\$9 00	With chain,	\$
No. 22,	-	-	-	-	"	11 00	"	" \$
No. 23,	-	-	-	-	"	13 00	"	" \$

SWITCH AND CAR-DOOR LOCKS.

Cuts shown $\frac{2}{3}$ actual size of Locks.

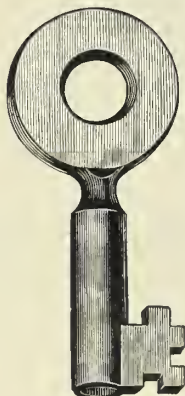
FIG. 1430.



Switch Lock.

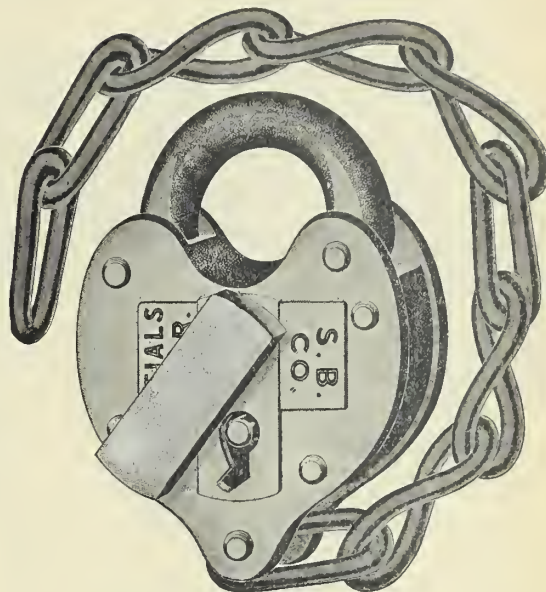
No. 1, with chain.

No. 2, without chain.



Switch Key.

FIG. 1431.

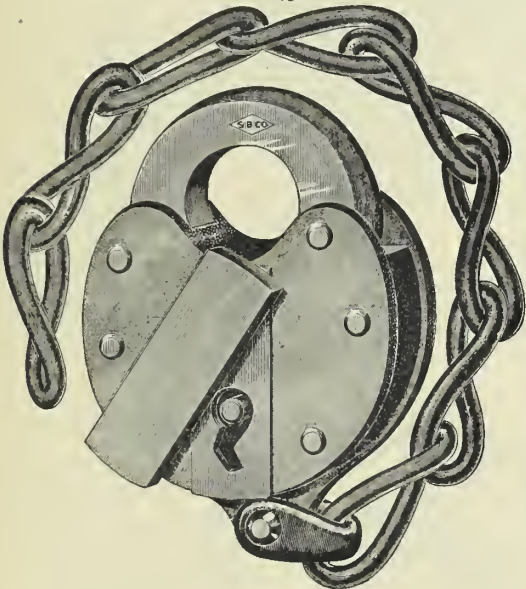


Switch Lock.

No. 3, with chain.

No. 4, without chain.

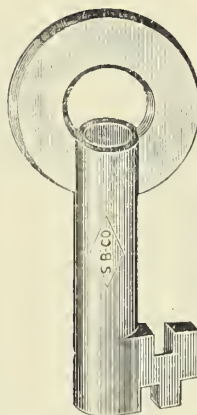
FIG. 1432.



Switch Lock.

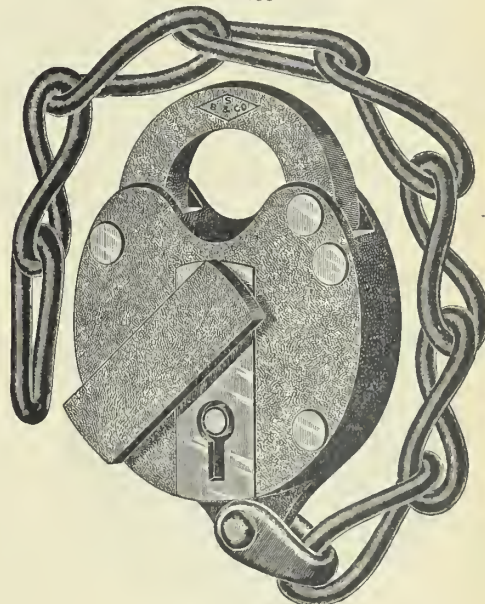
No. 7, with chain.

No. 8, without chain.



Switch Key.

FIG. 1433.



Switch Lock.

No. 1635, with chain. No. 1535, without chain.

DESCRIPTION.

Switch Lock No. 1 is all bronze metal with heavy cast bronze metal tumblers, bolt and shackle grip. The shackle is spring opening and lock spring locking. The springs are all phosphor-bronze; locks made to fit any key furnished, and where railroads want their initials cast on the lock the actual cost of extra patterns necessary for this is all that is charged. This also applies to all of the switch locks. The lock is one-half larger than size of illustration. The chain used is heavy German coil, japanned.

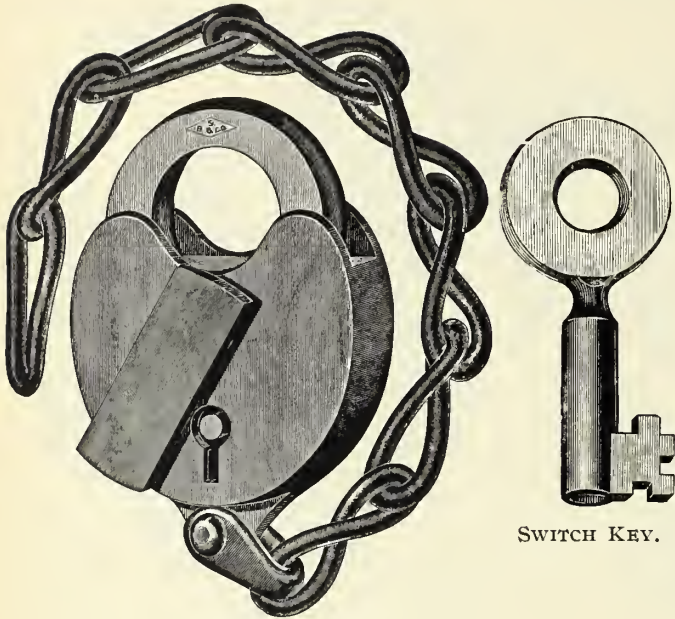
The same description would apply to lock No. 3, except that there is a slightly different arrangement of the interior mechanism. On both locks, Nos. 1 and 3, the drop which covers the keyhole is spring drop. Rivets are button head rivets. All parts are machine made and finished.

Lock No. 7 is a spring self-locking lock, with spring shackle; of gun metal bronze, phosphor-springs, cast bronze tumblers, bolts, plungers, etc., spring drop over the key hole, heavy German coil chain, japanned, patented spring plunger, which automatically closes the shackle opening when the shackle is thrown from the lock, thereby preventing the admission of cinders or other foreign matter to the interior of the lock, drain hole at the bottom of the lock to permit any water which may gain access to the interior to run therefrom, thereby preventing difficulty from freezing in winter time, and flush rivets. This same drain hole as mentioned in connection with No. 7 is also used in lock Nos. 3 and 1.

SWITCH AND CAR DOOR LOCKS, ETC., ETC.

Cuts shown, $\frac{3}{8}$ actual size of Locks.

FIG. 1434.



SWITCH KEY.

SWITCH LOCK.

No. 1636, with chain.

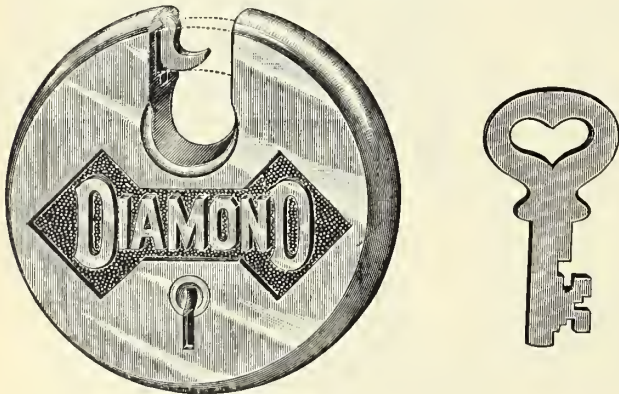
No. 1536, without chain.

Extra heavy; all bronze metal; heavy pivoted tumblers; locks polished and lacquered; phosphor-bronze springs; spring self-locking; spring shackle; dust-proof bronze metal keys; welded link chain.

No. 1636.	12 keyed,	-	-	-	per dozen, \$11 20
	24 keyed,	-	-	-	" 12 45

ROTARY SHACKLE AUTOMATIC PAD-LOCKS.

FIG. 1436.



No. 941.

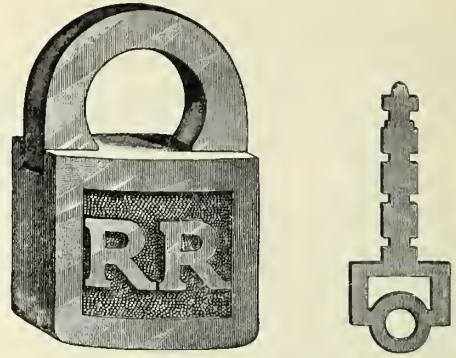
Size 2 inches.

OPERATION.

To unlock, the key is turned in the usual way, drawing the shackle into the case, where it is held, automatically, by the trigger, shown in the opening in the case, thereby releasing the object locked. To lock, the staple or eye-bolt is touched on the trigger shown in the opening of the case, thus releasing the shackle, which automatically rotates and locks the lock. This trigger, being near the top of the lock, will permit contact with the staple, no matter how short it may be, and consequent operation of lock.

Highest grade; all parts best quality bronze metal; three tumblers; indestructible phosphor-bronze springs; depressed background, finished in dead black enamel, balance of lock highly polished and lacquered; two rolled steel keys with each lock; no two alike in a dozen.

FIG. 1435.



No. 406.

High grade; extra heavy; all bronze metal; highly polished and lacquered; chased oval faced case; spring self-locking; spring shackle; phosphor-bronze springs; shackle-hole plungers and key-hole guard; rolled steel keys, milled; two keyed.

No. 406, - - - - - per dozen, \$5 20

FIG. 1437.

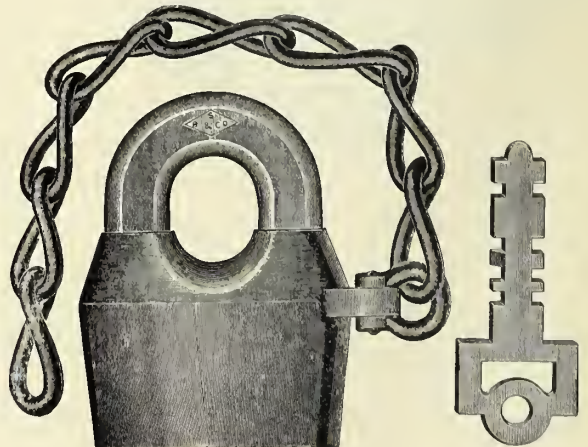


No. 88.

Highest grade; extra heavy; gun metal bronze alloy; phosphor-bronze springs; spring self-locking; lever lock; spring sliding shackles; locks highly polished and lacquered; rolled steel milled keys; two keyed; 9-inch welded link steel chain.

No. 88, - - - - - per dozen, \$10 65

FIG. 1438.



No. 5540.

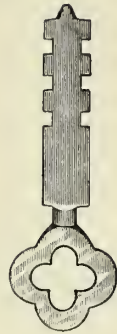
With 9 inch steel chain.

No. 5540, - - - - - per dozen, \$5 60

LOCKS.

Cuts shown two-thirds actual size of lock.

FIG. 1439.

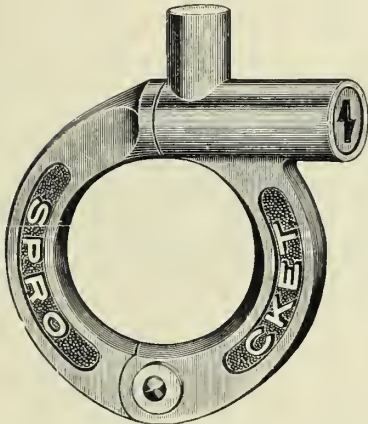


Iron. Spring self-locking. Scandanavian. Maroon finished case. Polished shackle. Two keyed.

No	Price
1010, - - - - -	Per dozen, \$8.00
1011, - - - - -	" 9.00
1012, - - - - -	" 11.00
1013, - - - - -	" 13.00

"EMPEROR."

FIG. 1441.



No. 790. NEW. BICYCLE SPROCKET WHEEL LOCK.

Spring self-locking. Spring opening. Phosphor bronze springs. Rolled steel keys, pressed and milled and nickel plated. 200 available changes. Two keyed.

No	Description.	Price, Per Doz.
790, all bronze metal, - - -	24-Keyed.	\$4.30
791, all bronze metal nickel plated, - - -		4.65
792, all aluminum nickel bronze alloy, - - -		5.00

BICYCLE LOCK OR LUGGAGE CHAINS.

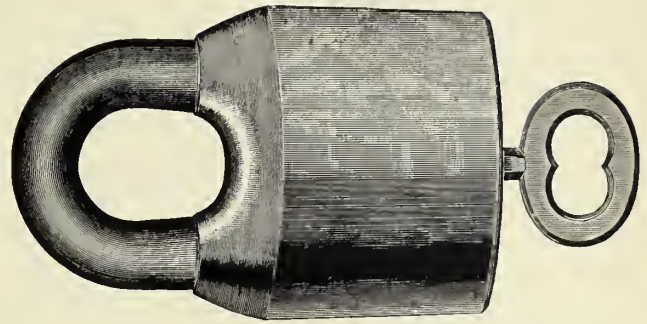
FIG. 1443.



These Chains are of cut steel, hardened, very strong, with stout cast steel rings on each end. Packed two dozen in a box.

No.	Length of Chain.	Polished Steel.	Same, Nickel Plated.	Same, Brass Plated.	No.	Length of Chain.	Polished Steel.	Same, Nickel Plated.	Same, Brass Plated.
1	12 inches	\$0.90	\$1.40	\$1.50	5	36 inches	\$2.50	\$3.15	\$3.20
2	18 "	1.30	1.80	1.90	6	43 "	2.90	3.60	3.65
3	24 "	1.70	2.20	2.30	7	48 "	3.30	4.00	4.05
4	30 "	2.10	2.70	2.75					

FIG. 1440.

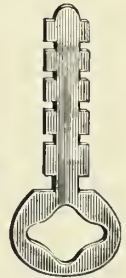
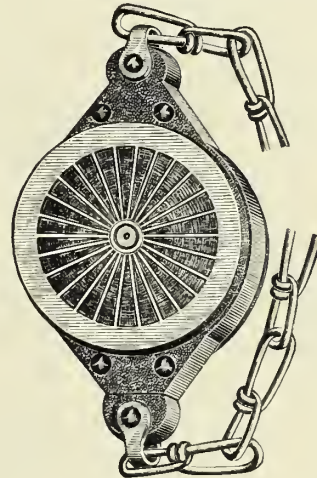


All malleable iron. Extra heavy. Key-Locking Scandanavia. Pad Lock. Crimson finished case. Polished shackle. Two-keyed secured shackle.

No.	Price.
109, - - - - -	Per dozen, \$8.00
113, - - - - -	" 6.50
114, - - - - -	" 10.00

PURE ALUMINUM BICYCLE LOCK.

FIG. 1442.

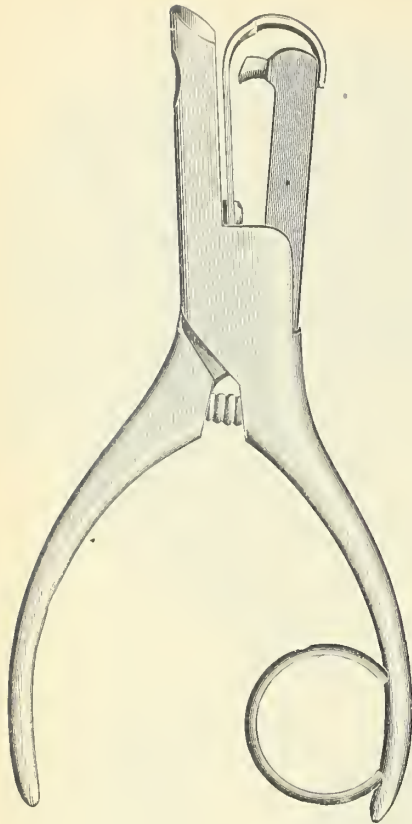


No. 07030. HIGHEST GRADE. BEST QUALITY.

Spring self locking. Phosphor bronze springs. Fifteen inch tempered strong steel chain. Rolled steel keys, milled and nickel plated. Two keyed.

No.	Description.	Price, Per Doz.
7020, all bronze metal, highly polished, with chain,	24-Keyed.	\$5.45
07030, all pure aluminum, highly polished, with chain,		6.30
7040, all aluminum silver, raised parts highly polished, back-ground antique bronze,		6.60

FIG. 1444.



PATENT ACME TICKET PUNCH.

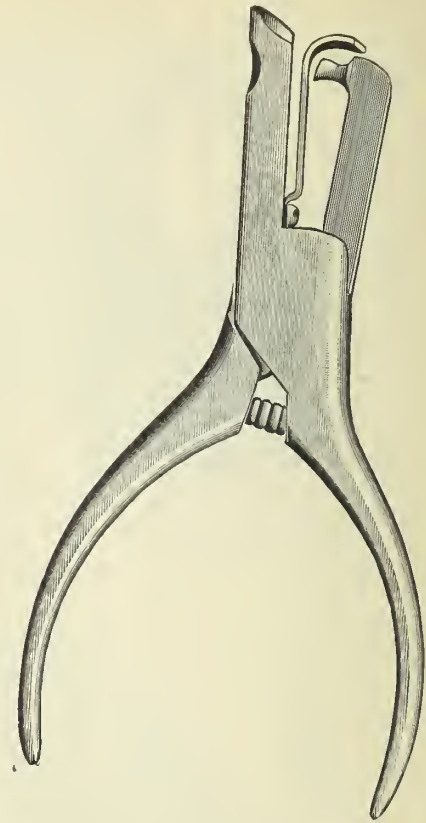
	Per doz.
Assorted dies, - - - - -	\$30 00
L. Punches, - - - - -	28 00
B Punches, - - - - -	28 00
L. Punches, plain, - - - - -	24 00
Round dies, - - - - -	18 00
Square dies, - - - - -	19 00

Single punches, \$3.00 each.

EUREKA TICKET PUNCH.

	Per doz.
Assorted dies, - - - - -	\$24 00
L. Punches, - - - - -	23 00
B Punches, - - - - -	24 00
L. Punches, plain, - - - - -	22 00
Round dies, - - - - -	18 00
Square dies, - - - - -	19 00

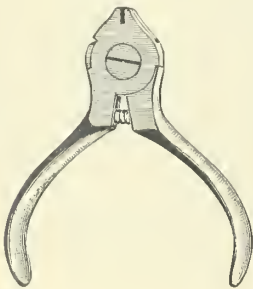
Single punch, \$2.25.



DESIGNS FOR PATENT TICKET PUNCHES.

All punches highly finished, nickel plated and warranted.

FIG. 1446.



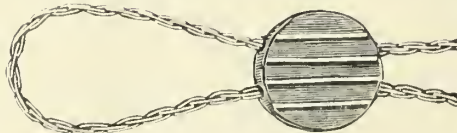
Woodman's Wire Cutter.

SEALING DEVICES.

We would respectfully call the attention of electric companies and others to the superior line of Sealing Devices we manufacture for sealing electric meters, ticket, and cash bags, and for various other purposes, so that contents cannot be tampered with after once sealed. Prices will be quoted on application as to quantity, etc. Send for regular list.

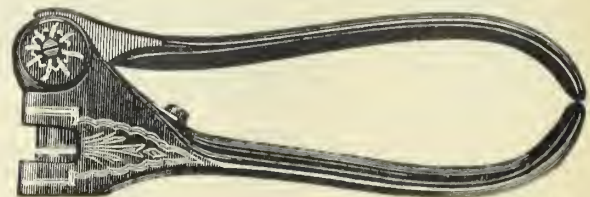


FIG. 1447.



Lead Seal and Wire.

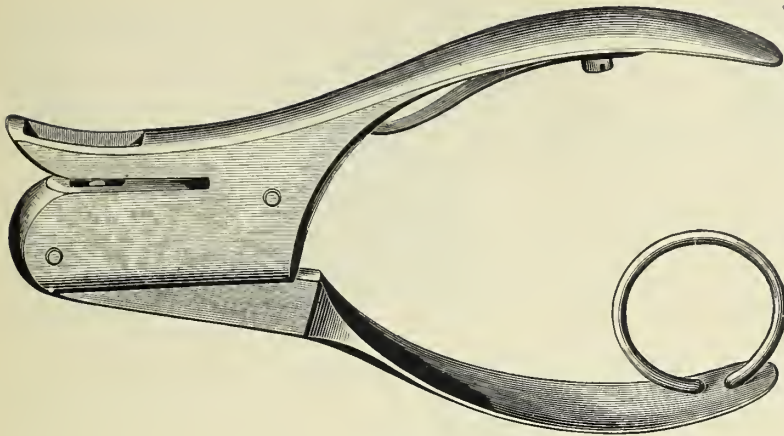
FIG. 1448.



No. 4 Lead Sealing Press.

PATENT TICKET PUNCH.

FIG. 1449.



No. 1.

SIZE No. 1.

General assortment of dies,	-	per dozen, \$24 00
Round dies,	- - - -	" 18 00
Square dies,	- - - -	" 19 00
Single punch,	- - - -	each, 2 50

SIZE No. 2.

Assorted dies,	- - - -	per dozen, 30 00
Square dies,	- - - -	" 19 00
B Punches,	- - - -	" 26 00
Round dies,	- - - -	" 18 00
L Punches,	- - - -	" 28 00
L Punches, plain,	- - - -	" 24 00
Single punch,	- - - -	each, 3 00

SIZE No. 3.

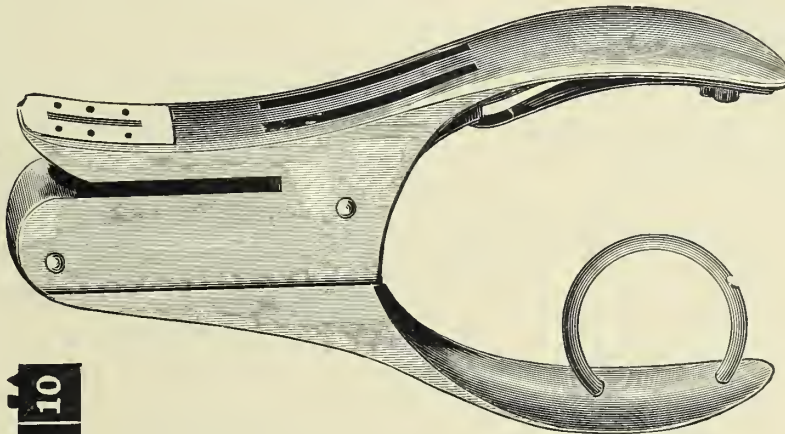
B. C.,	- - - -	per dozen, 40 00
S. C.,	- - - -	" 40 00
1/2,	- - - -	" 40 00
Single punch,	- - - -	each, 4 00

SIZE No. 4.

Any two designs from list of dies,	per dozen, \$57 00
Single punch with both characters,	5 00
2 C and 1/2,	per dozen, 72 00
Single punch, with both characters,	6 50

PATENT COUPON EXTENSION TICKET PUNCH.

FIG. 1450.



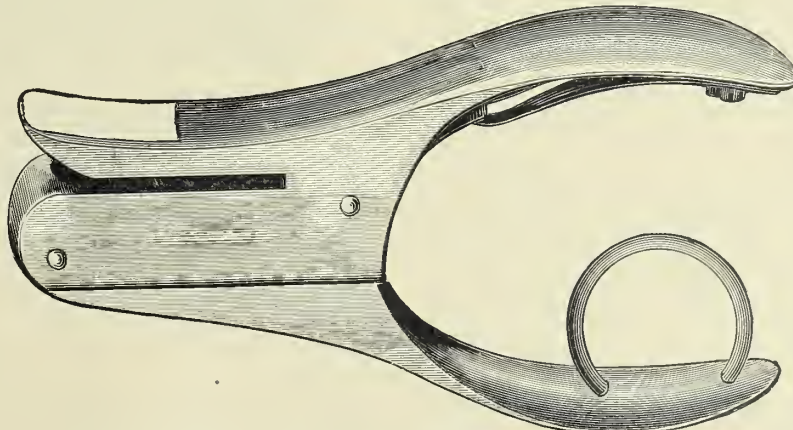
PATENT COUPON EXTENSION TICKET PUNCH.

These cuts very clearly demonstrate the construction of the punch and its upper jaw as well as the margin of the ticket after being punched.

No time is lost in punching coupon tickets with this punch, as all coupons are folded and punched at the same time. Such as Stromberg tickets, etc.

Price,	- - - -	per dozen, \$42 00
Singly,	- - - -	each, 4 00

FIG. 1451.



PATENT EDGE CUTTER FOR COMMUTATION TICKETS.

Price,	- - - -	per dozen, \$40 00
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Alexandria
Bethlehem
Columbus
Deseronto
Evansville
Fayette
Grand Rapids
Harrisburg
Jacksonville
Kalamazoo
Lancaster
Minneapolis



PATENT MULTIPLEX RUBBER STAMP HOLDER.



FIG. 1452.

In this little ingenious combination you have a receptacle that will hold from three to a dozen or more rubber stamps. Any one stamp can be brought to the front by simply pushing the thumb-nut in the opposite direction, and at the same time turning it around till you bring the desired stamp to the front, in which case it locks itself to the index.

This little device will be found invaluable in the freight shipping departments of railroad commission houses, wholesale houses, banks, express companies, etc. It is made in five different styles, viz., triangle, four-square, six-square, eight square and twelve-square.

Price, \$9.00 per dozen.

FIG. 1455.



Size.	Prices.
1-32 inch, - - -	\$4 50
1-24 inch, - - -	4 50
1-20 inch, - - -	4 00
1-16 inch, - - -	4 00
3-32 inch, - - -	4 00

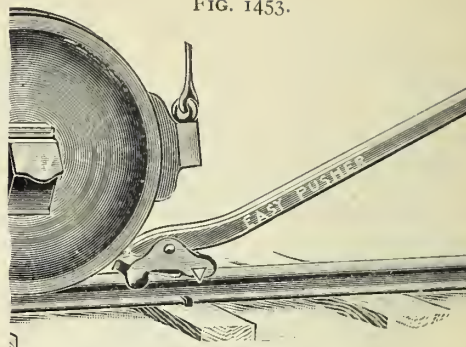
Size.	Prices.
1-32 inch, - - -	\$1 50
1-24 inch, - - -	1 50
1-20 inch, - - -	1 50
1-16 inch, - - -	1 50
3-32 inch, - - -	1 35

THE EASY PUSHER.

FIG. 1453.

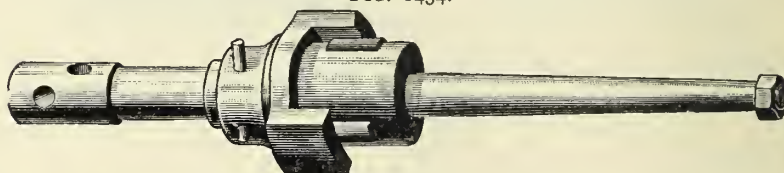
It is stronger than any other car mover ever made, and will move twice as many cars.

Price, \$5 00



IMPROVED TYPE OF ROLLER TUBE EXPANDER.

FIG. 1454.



This Expander has a solid body. It is made from the best material and with great care. One expander will answer for any thickness of tube sheet.

Diameter, inches,	1	1 1/4	1 1/2	1 3/4	1 7/8	2	2 1/4	2 1/2	2 3/4
Price, each, -	\$10.00	10 00	10 00	10 00	10 00	10 00	12 00	14 00	16 00

Diameter, inches,	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	5	6
Price, each, -	\$18 00	20 00	23 00	25 00	30 00	35 00	40 00	50 00	60 00

The dimensions refer to the outside diameter of the tube. Special sizes made to order.

STEEL STAMPS.

For stamping steel, iron, brass, wood, leather, bone, celluloid and other substances.

Size.	Prices per Letter.	Size.	Prices per Letter.
1-64 inch, - - -	\$0 20	1-8 inch, - - -	\$0.15
1-32 inch, - - -	.15	5-32 inch, - - -	.18
1-24 inch, - - -	.15	3-16 inch, - - -	.20
1-20 inch, - - -	.15	1-4 inch, - - -	.25
1-16 inch, - - -	.15	5-16 inch, - - -	.30
3-32 inch, - - -	.15	3-8 inch, - - -	.35
1-10 inch, - - -	.15	1-2 inch, - - -	.45

No extra charge for steel except on sizes larger than 1/8 inch, when the charge for steel and forgings will be at the rate of 40 cents per pound.

In ordering stamps write distinctly and state what stamps are to be used for, as this is very important.

STEEL ALPHABETS AND FIGURES.

Alphabets, per set of 27 pieces.

Size.	Prices.
1-10 inch, - - -	\$4 00
1-8 inch, - - -	4 00
5-32 inch, - - -	4 50
3-16 inch, - - -	5 50
1-4 inch, - - -	6 25

Figures, per set of 9 pieces.

Size.	Prices.
1-10 inch, - - -	\$1 35
1-8 inch, - - -	1 35
5-32 inch, - - -	1 50
3-16 inch, - - -	1 85
1-4 inch, - - -	2 25

Size.	Prices.
5-16 inch, - - -	\$7 00
3-8 inch, - - -	8 00
1-2 inch, - - -	12 00
3-4 inch, - - -	17 00

Size.	Prices.
5-16 inch, - - -	\$2 50
3-8 inch, - - -	3 00
1-2 inch, - - -	4 50
3-4 inch, - - -	6 00

WASHITA OILSTONES.

FIG. 1456.



LILY WHITE WASHITA.

This is the best selection of the extra quality. It is perfectly white, of very even texture, free from foreign substances and perfect in finish. Each stone has a guaranty label and a small diamond label on one end, both bearing our trade mark.

This brand should be used for all tools requiring a fine, smooth edge, such as desired in working pine or other soft lumber.

ROSY RED WASHITA.

This brand is especially selected from rock taken from the old "Rosy Red Quarry," discovered about 1860. It has gained a wide reputation because of its quick sharpening qualities. It is tinted or streaked more or less with a pinkish orange or dull red color, and has an even, porous grit, somewhat courser than the Lily White.

PRICE LIST.

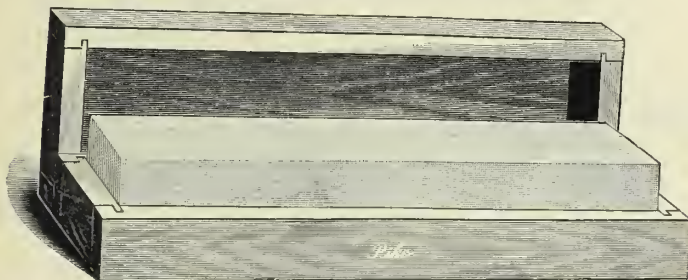
Lily White Washita, per pound,	\$0.60
Rosy Red Washita, per pound,	.60
Extra Washita, green paper wrapper, per pound,	.50
No. 1 Washita,	.40
No. 2 Washita,	.30

Packed in 14 and 25 pound boxes, 100 and 112 pounds in a case, and furnished in four assortments, about as follows:

- G, 4 to 8 x 2 inches, x $\frac{7}{8}$ to 1 $\frac{1}{8}$ inches.
H, 6 to 8 x 2 inches, x $\frac{7}{8}$ to 1 $\frac{1}{8}$ inches.
K, 8 x 2 inches, x $\frac{7}{8}$ to 1 $\frac{1}{8}$ inches.
L, 9 x 2 to 2 $\frac{1}{2}$ inches, x $\frac{7}{8}$ to 1 $\frac{1}{8}$ inches.

The Lily White and Rosy Red brands are wrapped in printed circulars giving description and directions for use, in the English, French and German languages. They are especially put up for retail trade, each stone in a strong, neat paper case, very convenient for window or shelf display.

FIG. 1459.

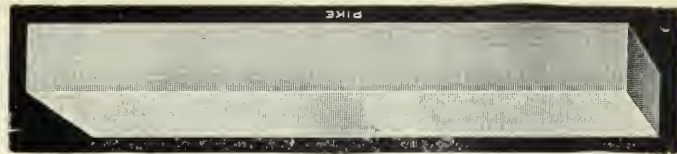


WASHITA MOUNTED.

In handsomely polished cherry boxes.

	No. 1.	Lily White and Rosy Red.
9 x 2 inches, per dozen,	\$14.00	\$16.00
8 x 2 " "	12.00	14.00
7 x 2 " "	11.00	13.00
6 x 2 " "	10.00	11.50
5 x 2 " "	9.00	10.00
4 x 1 $\frac{1}{2}$ " "	7.00	9.00
3 $\frac{1}{2}$ x 1 " "	5.50	6.00
In vulcanized rubber boxes.		
3 $\frac{1}{2}$ x 1 inch, per dozen,	-	7.00

FIG. 1457.



ARKANSAS OILSTONES.

REGULAR BENCH STONES.

Are furnished in the following assortments:

Asst. Quality	Length.	Width	Thickness.	Price per Pound.
				Hard. Soft.
A, No. 1,	3 to 5 $\frac{1}{2}$	x 1 $\frac{3}{4}$ to 2 x $\frac{3}{4}$	to 1 inch	\$2.80 \$1.50
B, No. 1,	5 $\frac{1}{2}$ to 8	x 1 $\frac{3}{4}$ to 2 x $\frac{3}{4}$	to 1 inch,	3.50 1.70
C, No. 1,	8 to 12	x 1 $\frac{3}{4}$ to 2 x $\frac{3}{4}$	to 1 inch,	4.00 1.90
D, No. 2,	3 to 5 $\frac{1}{2}$	x 1 $\frac{3}{4}$ to 2 x $\frac{3}{4}$	to 1 inch,	1.00 .50
E, No. 2,	5 $\frac{1}{2}$ to 8	x 1 $\frac{3}{4}$ to 2 x $\frac{3}{4}$	to 1 inch,	1.50 .70

Packed in 14 and 25 pound boxes.

FIG. 1458.



WASHITA SLIPS.

About 3 to 5 x 1 $\frac{3}{4}$ to 2 x $\frac{3}{8}$ to $\frac{5}{8}$ back x $\frac{1}{8}$ to $\frac{5}{16}$ inch edge.

Lily White, per pound,	\$0.90
Rosy Red, " "	.90
Extra, " "	.80
No. 1, " "	.70
No. 2, " "	.40

FLAT SLIPS.

* 3 to 5 x 1 $\frac{3}{4}$ to 2 x $\frac{3}{8}$ to $\frac{5}{8}$ inch, per pound,	\$0.70
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GRINDSTONES.

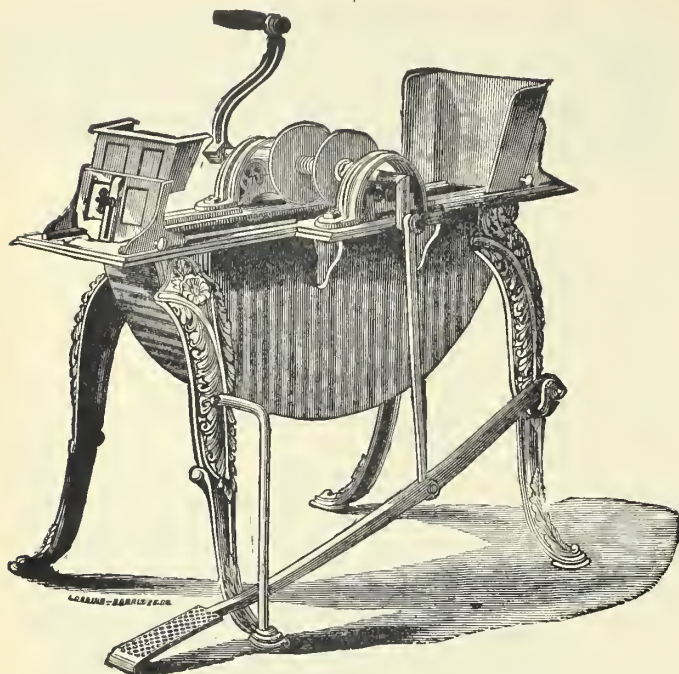
Nova Scotia, regular sizes and grits, per ton,	\$
Ohio, regular sizes and grits,	
Farm and shop stones, under 2 inches thick, per pound,	.02
Single stones, under 1000 pounds weight,	.02
Spindle stones, Beacon grit, 4 in. thick and under,	.02
English Newcastle stones,	.02
Very thin stones, for shoe knives and moulding tools, per inch diameter,	.12 $\frac{1}{2}$
Cartage charged on less than car load lots.	

N. B.—When corresponding, please state purpose for which stone is required, and size wanted.

Nova Scotia scythe stones, full oval, per gross,	\$3.00
Red-Sea oilstones, in 25 pound boxes, per pound,	.15
Axe bits, per 100,	3.00
Kitchen and shoe knife stones, assorted sizes, per 100,	5.00
Currier's rub stones, per dozen,	9.00
Green grit, very fine, for polishing marble, per ton,	20.00
Red grit, " " " " " " " " " " " "	20.00
Yellow grit, coarse and soft, for polishing marble, per ton,	10.00
Fine blue grit, " " " " " " " " " " " "	15.00

PATENT CAST IRON GRINDSTONE FRAME.

FIG. 1460.

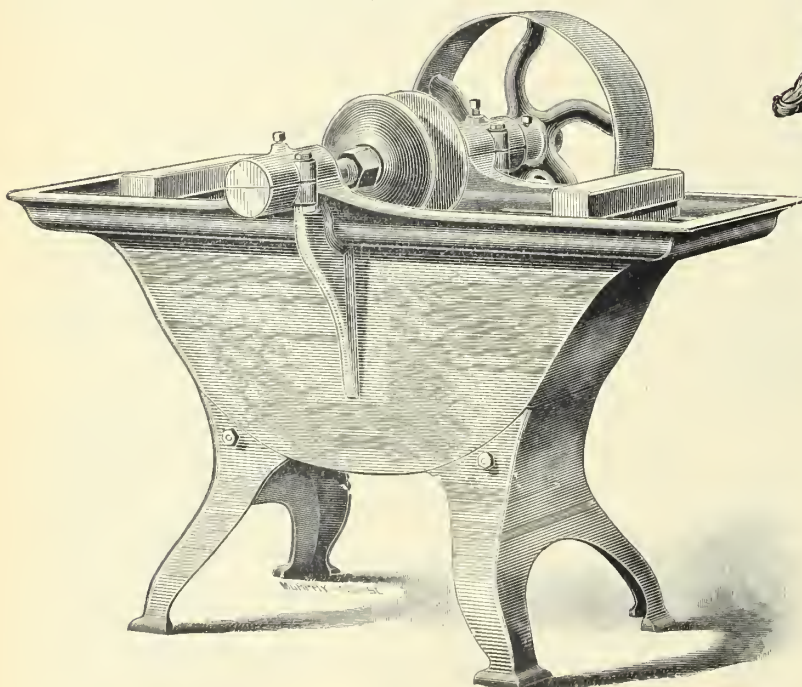


The above cut shows an improved grindstone frame, a most useful article where a power grindstone is required. They are handsomely finished, with adjustable tool rests, all ready to belt on to power.

	Each-
With pulley for power, to swing stone 30 by 4½ inches,	\$15 00
Arranged with pulley and treadle for power and foot,	16 00
For size to swing stone 48 by 6 inches, with pulley for power,	50 00

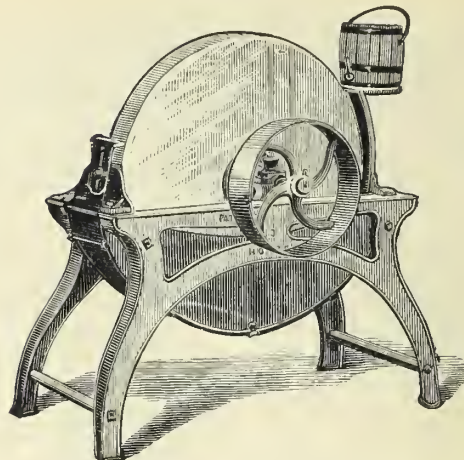
We have same frame as above arranged to be run by hand or foot, suitable to swing 30 by 4½ inch stone. Price, each, \$12.00.

FIG. 1461.



MACHINE SHOP GRINDSTONES.

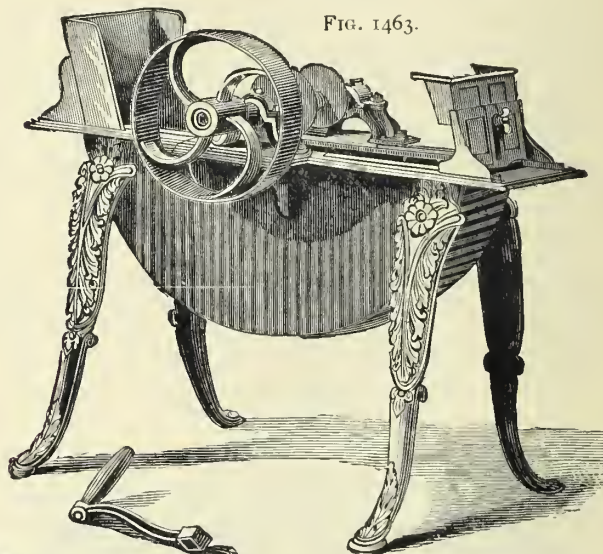
FIG. 1462.



Mounted on iron frames with water box. Stones expressly selected.

25 inches, with either pulley or treadle,	\$14 00
Shield and water bucket, extra,	1 00
Hand crank, extra,	50

FIG. 1463.



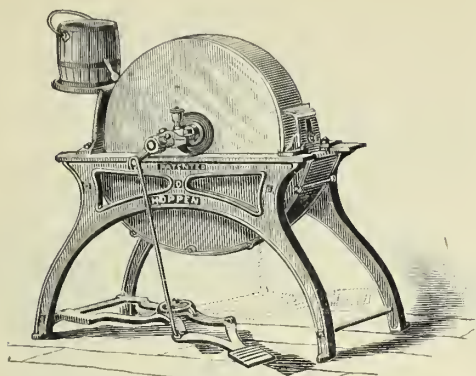
GRINDSTONE TROUGH.

The casting is neat in appearance, and all around the top has an ample channel that catches about all the water that flies from the stone. At the bottom is a plug that can be removed when the trough is to be emptied. The shaft is carried in self-oiling and self-adjusting boxes, and is thoroughly protected from the excessive wear that is common to the usual arrangement.

Frame for 36 inch stone, with shaft, boxes and pulley, 20 inch diameter, 4 inch face,	\$35 00
Frame for 48 inch stone, with shaft, boxes and pulley, 22 inch diameter, 4 inch face,	45 00

GRINDSTONE TROUGH No. 6—LIGHT.

FIG. 1464.



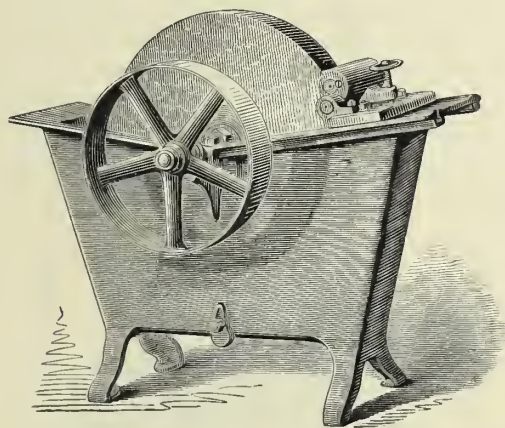
With American Stones, Pulleys and Rests.

Weight of Stones.	Size About.	Price.	Size of Pulley.
85 to 90 pounds	24 x 2½ inches	\$16.45	10 x 2 inches
150 to 160 "	27 x 3½ "	24.00	10 x 2 "
200 to 220 "	30 x 3½ "	31.70	12 x 3½ "

Water Pots, \$1.00 and \$2.00 extra.

IMPROVED GRINDSTONE TROUGH.

FIG. 1466.



This cut illustrates a Grindstone Trough combining a number of very desirable features. In addition to the ordinary arrangement of trough, spindle and pulley, which is 20 inches diameter and 4½ inch face, it is provided with self oiling boxes, and an adjustable truing device, which can be instantly applied to the face of the stone, working automatically, and without dust, keeping the face always in good shape, without interfering with its constant use.

DIRECTIONS.—The stone should revolve so as to have the device upon the face which moves upwards. The main stand or bottom piece of the device is securely clamped upon the trough close to the face of the stone, then by turning the hand wheel the threaded roll is brought into contact with the stone and allowed to remain as long as is requisite to produce the desired result. The water is to be left in the trough as usual. When by long use the thread on the hardened roll becomes worn, it can be re-cut, which operation may be repeated.

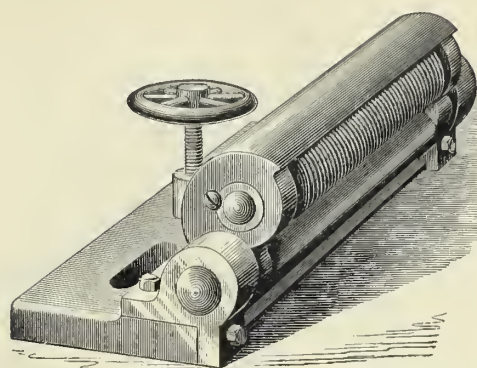
The stone should revolve at a surface speed of about 500' to 550' per minute.

Weight, 650 pounds, with stone 39 inches diameter, 5 inch face, 1280 pounds.

Price, without stone, \$70.00. Price, with stone, \$85.00.

GRINDSTONE TRUING DEVICE.

FIG. 1465.



One of the most disagreeable things to be done in a workshop is the truing of grindstones. It is, therefore, often the case that they are allowed to become quite out of shape and untrue, very much to the annoyance of the workman, who finds it almost impossible to grind his tools in a proper manner. The above cut illustrates a device which is well adapted for truing and keeping the face of grindstones constantly in good shape. This can be instantly applied to the face of the stone, working automatically, and without dust, keeping the face always in good shape, without interfering with its constant use.

DIRECTIONS.—The main stand or bottom piece is securely clamped upon the trough, close to the face of the stone; then by turning the hand wheel, the threaded roll is brought into contact with the face of the stone, and is allowed to remain as long as is requisite to produce the desired result. The water is to be left as usual in the trough. When by long use the thread on the hardened roll becomes worn, it can be re-cut, which operation may be repeated. The stone should revolve so as to have the device upon the face which moves upward, and the device should be well oiled before it is used.

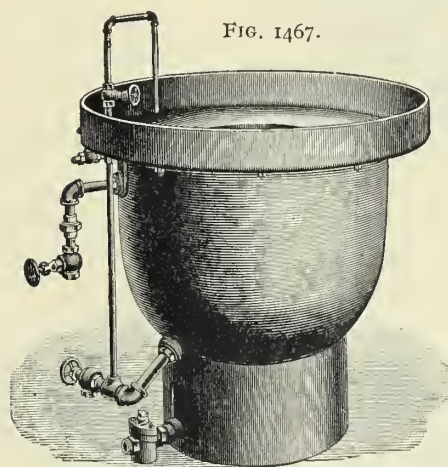
The device should not be used on stones revolving at a greater surface speed than about 500' or 550' per minute.

Price, with 7 inch roll, \$13 00
Price, with 12 inch roll, 17.00

Price of 7 inch roll, \$6 00
Price of 12 inch roll, 8.00

SODA KETTLE.

FIG. 1467.



This Kettle is used for cleaning or removing grease and dirt from small tools or parts of machines. A coil of steam pipe is employed to heat the water, in which a quantity of soda has been placed, and the pieces immersed in the solution when taken out, dry without rusting.

The kettles are usually made with round tops and stand in the centre of the room among the machines, but

they are also made of a form suitable to place against a wall or in a corner.

Outside diameter of top plate, 38 inches; diameter of kettles, 29 inches; diameter of inside coil of pipe, 24 inches; height from floor to top of flange, 37 inches; depth of kettle, 22 inches; diameter of wire basket or cage for receiving the work, 11 inches; depth of basket, 16 inches. Capacity of kettle, about 60 gallons.

A perforated bucket or shaker, 6¼ inches diameter, 13 inches long, is conveniently used in washing small pieces.

Weight, about 750 pounds. Net weight, about 555 pounds.

The price includes interior coil of pipe, wire basket, perforated bucket or shaker and the pipe with valves, etc., as shown in cut.

NEW VISES FOR BICYCLE MANUFACTURERS.

FIG. 1468.

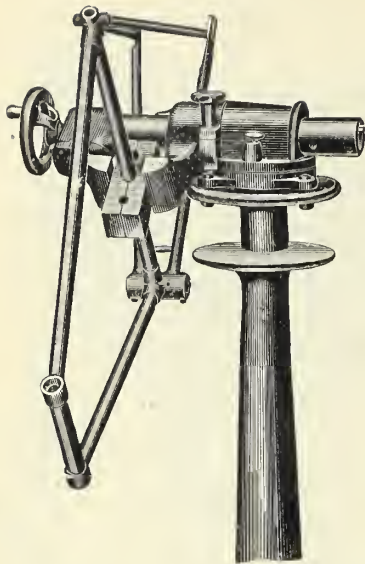


FIG. 1469.

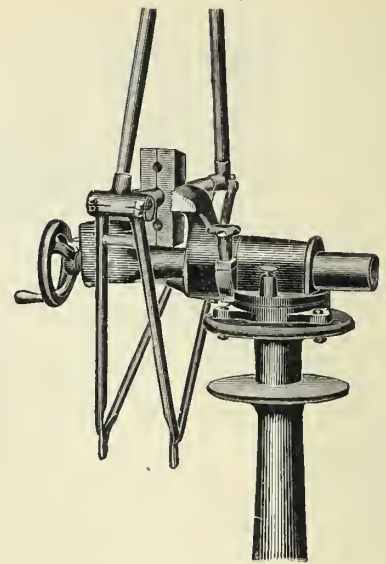


FIG. 1470.



This vise has no equal for convenience and as a time saver.

The accompanying cuts illustrate the several positions in which frame can be instantly adjusted, by action of the revolving sleeve, necessitating no change in the clamping of the frame; also showing stand, with tool bracket, especially adapted for use with vise.

Bicycle manufacturers will at once recognize the value of this vise as a time-saver, and for convenience in the filing of the frames. The record of it so far is that 25 per cent. more work can be accomplished, as compared with the use of the ordinary style of vise.

A wheel is used in place of lever to clamp vise, thus increasing the speed of action and offering greater convenience. When the frame is clamped, the same can be rotated to right or left instantly, describing a complete circle if desired, without changing the original position of frame in vise. This revolving action enables the operator to easily reach any part of the frame, and fully complete the work of filing without once changing the clamp on the frame.

The vise is swiveled at base, and is adapted to use on a bench, as any ordinary vise, but we recommend the use of our vise stand, because of its economy in room and the advantages to operator in being able to adjust frame to any position.

FIG. 1471.

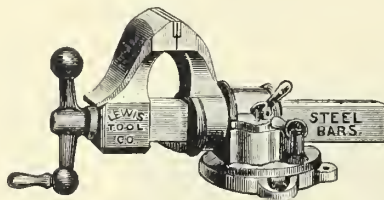
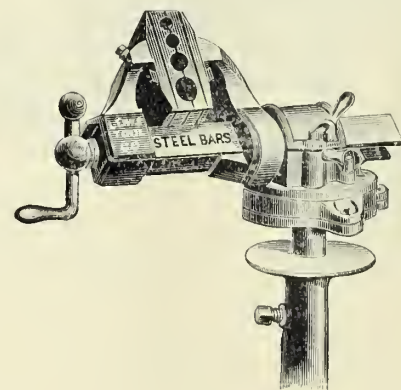


FIG. 1472.



PATENT BICYCLE VISE.

With Clamp and Adjustable Post.

This vise is made especially for holding bicycle frames, and is equally good as an assembling vise for sewing machines, gun and pistol work, and for many other purposes. It has our patent swivel bottom. The jaws are made to revolve, and be firmly held at any desired position. The slide bars are of wrought steel.

In making this vise, we have consulted the wishes of the people who use this kind of tool, and we believe it is the best on the market. They are furnished with balance crank to move jaws quickly, as shown in cut, or with the usual lever, as ordered.

The clamp is firmly held on vise jaws as shown in above cut

The grooves in wood part of clamp are made $\frac{5}{8}$, $\frac{3}{4}$, 1 inch, and $1\frac{1}{8}$ inch in diameter, but they can be bored to any required size, and as the woods are screwed on, they can be easily renewed.

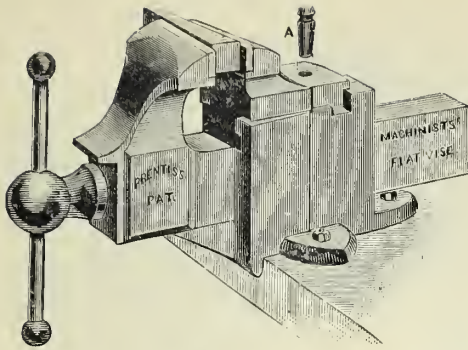
The iron post for holding vise is made adjustable to any required height to suit workman, from 30 to 38 inches.

These vises are sold with or without clamp or post.

No. 110.	Width of jaws, 4 inches; open, $5\frac{1}{2}$ inches; weight, 56 pounds,	-	-	-	-	-	-	-	-	price, \$12 00
" 111.	Wood faced, malleable iron clamp,	-	-	-	-	-	-	-	-	" 1 50
" 113.	Adjustable iron post,	-	-	-	-	-	-	-	-	" 6 00

VICES.

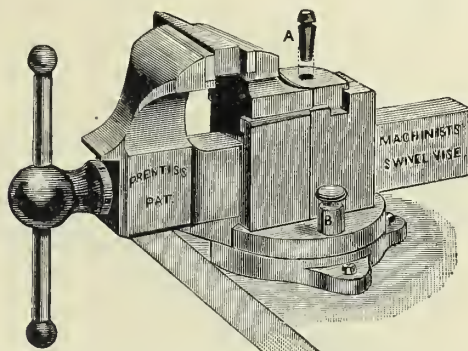
FIG. 1473.



PRENTISS' PATENT SELF-ADJUSTING JAW, MACHINISTS' STATIONARY BOTTOM VISE.

No.			Price.
1.	Stationary bottom. 2½ inch jaws.	Opens 3½ inches.	
	Weight, 13½ pounds,	- - -	\$5 50
2.	Stationary bottom. 3½ inch jaws.	Opens 4¾ inches	
	Weight, 28 pounds,	- - -	7 00
2½.	Stationary bottom, 4 inch jaws.	Opens 5¼ inches.	
	Weight, 41 pounds,	- - -	9 00
3.	Stationary bottom. 4½ inch jaws.	Opens 6 inches.	
	Weight, 54 pounds,	- - -	10 50
4.	Stationary bottom. 5¼ inch jaws.	Opens 8 inches.	
	Weight, 96 pounds,	- - -	17 00
5.	Stationary bottom. 6 inch jaws.	Opens 9 inches.	
	Weight, 146 pounds,	- - -	24 00
6.	Stationary bottom. 7 inch jaws.	Opens 11 inches.	
	Weight, 184 pounds,	- - -	30 00

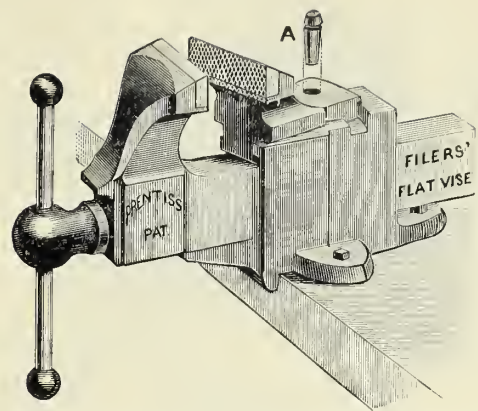
FIG. 1475.



PRENTISS' PATENT SELF-ADJUSTING JAW MACHINISTS SWIVEL BOTTOM VISE.

No.			Price.
18.	Patent swivel bottom. 2½ inch jaws.	Opens 3½ inches.	
	Weight, 17 pounds,	- - -	\$6 75
19.	Patent swivel bottom. 3½ inch jaws.	Opens 4¾ inches.	
	Weight, 32 pounds,	- - -	8 50
19½.	Patent swivel bottom. 4 inch jaws.	Opens 5¼ inches.	
	Weight, 46 pounds,	- - -	10 50
20.	Patent swivel bottom. 4½ inch jaws.	Opens 6 inches.	
	Weight, 65 pounds,	- - -	12 50
21.	Patent swivel bottom. 5¼ inch jaws.	Opens 8 inches.	
	Weight, 109 pounds,	- - -	19 00
22.	Patent swivel bottom. 6 inch jaws.	Opens 9 inches.	
	Weight, 168 pounds,	- - -	27 00
23.	Patent swivel bottom. 7 inch jaws.	Opens 11 inches.	
	Weight, 207 pounds,	- - -	35 00

FIG. 1474.



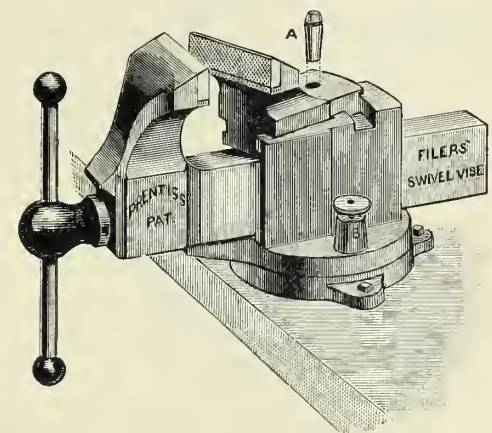
STATIONARY BOTTOM, FILERS' SELF-ADJUSTING JAW VISE

We call special attention to new model filers' or finishers' vises having increased the weight and size, making them the strongest vises of this style ever offered.

Rough-cut or smooth jaws, as ordered.

No.			Price.
42.	Stationary bottom. 4¼ inch jaws.	Opens 5¼ inches.	
	Weight, 42 pounds,	- - -	\$8 00

FIG. 1476.



PATENT SWIVEL BOTTOM, FILERS' SELF-ADJUSTING JAW VISE.

These implements are especially designed to satisfy demand for a vise of this class, embracing the advantages of our patent self-adjusting jaw and patent swivel bottom. The peculiarities of its construction are lean, high jaws, long arm and large throat.

No.			Price.
47.	Patent swivel Bottom 4¼ inch jaw.	Opens 5¼ inches.	
	Weight, 47 pounds,	- - -	\$10 00

FIG. 1477.

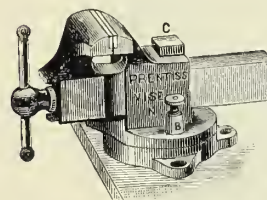
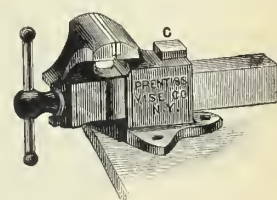


FIG. 1478.

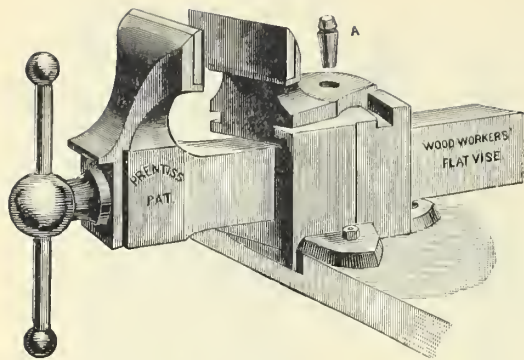


NEW SOLID JAW JEWELERS' VISES.

These vises have solid back jaws, instead of "self-adjusting jaws," as shown above.

No.			Price.
34.	Stationary bottom. 2 inch jaws.	Opens 2 inches,	\$3 00
39.	Swivel bottom. 2 inch jaws.	Opens 2 inches, -	4 00

FIG. 1479.

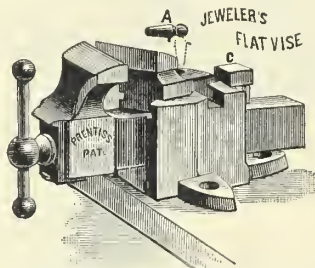


STATIONARY BOTTOM, COACH-MAKERS' SELF-ADJUSTING JAW VISE.

Coach-Makers' Vises which are constructed upon the same principles as the Iron-Workers' before described, are acknowledged to possess many advantages over any other yet offered for use of car and carriage builders, furniture manufacturers, pattern makers and all wood workers.

No.		Price.
12.	Stationary bottom. 3½ inch jaws. Opens 7 inches. Weight, 30 pounds,	\$8 00
10.	Stationary bottom. 4½ inch jaws. Opens 9½ inches. Weight, 59 pounds,	11 00

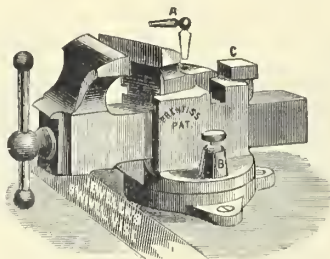
FIG. 1481.



PRENTISS' PATENT SELF-ADJUSTING JAW VISES FOR JEWELERS.

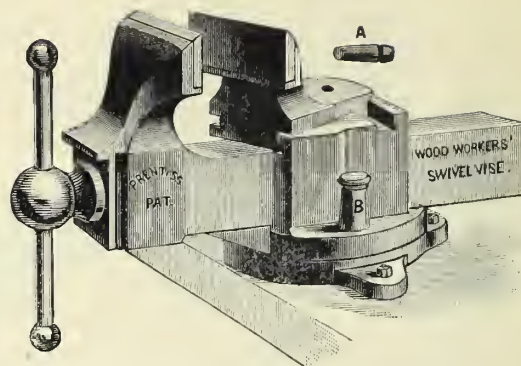
No.		Price.
30.	Stationary bottom. 1¾ inch jaws. Opens 1¾ inches,	\$3 50
31.	Same as above, nickel plated,	5 75
32.	Stationary bottom. 2 inch jaws. Opens 2 inches,	4 00
33.	Same as above, nickel plated,	6 50

FIG. 1483.



No.		Price.
35.	Swivel bottom. 1¾ inch jaws. Opens 1¾ inches,	\$4 50
36.	Same as above, nickel plated,	6 75
37.	Swivel bottom. 2 inch jaws. Opens 2 inches,	5 00
38.	Same as above, nickel plated,	7 50

FIG. 1480.

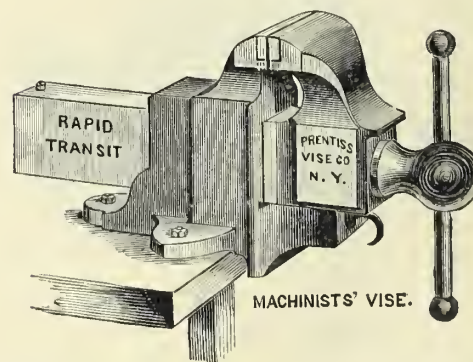


PATENT SWIVEL BOTTOM, COACH-MAKERS' SELF-ADJUSTING JAW VISE.

Self-Adjusting Jaw, combined with the patent swivel bottom, makes the best vise ever offered artisans in wood, the large surfaces of the jaws (which are finished perfectly smooth) protecting the work from injury, while the self-adjusting jaw easily and firmly holds articles of any shape.

No.		Price.
27.	Patent swivel bottom. 3½ inch jaws. Opens 7 inches. Weight, 34 pounds,	\$9 50
26.	Patent swivel bottom. 4½ inch jaws. Opens 9½ inches. Weight, 67 pounds,	13 00

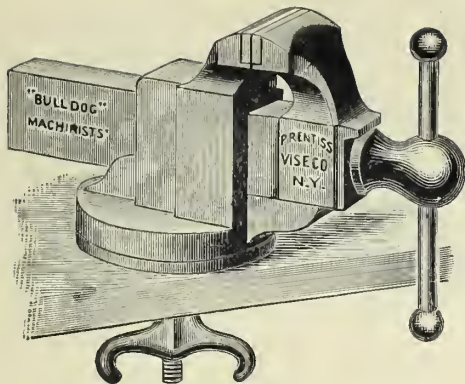
FIG. 1482.



PRENTISS' PATENT MACHINISTS' NEW RAPID TRANSIT VISE.

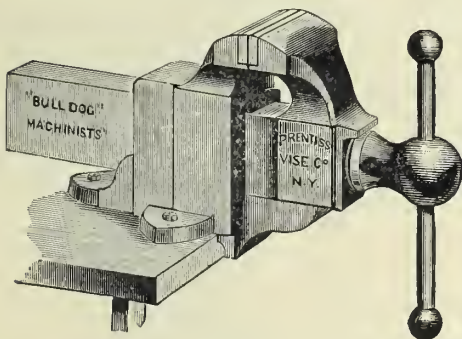
No.		Price.
70.	Stationary bottom. 3 inch jaws. Opens 3½ inches. Weight, 22 pounds,	\$6 50
71.	Stationary bottom. 3¾ inch jaws. Opens 4½ inches. Weight, 33 pounds,	8 00
72.	Stationary bottom. 4¼ inch jaws. Opens 5½ inches. Weight, 54 pounds,	11 00
73.	Stationary bottom. 4¾ inch jaws. Opens 6½ inches. Weight, 65 pounds,	13 50
74.	Stationary bottom. 5½ inch jaws. Opens 8 inches. Weight, 98 pounds,	19 00
75.	Stationary bottom. 6½ inch jaws. Opens 9½ inches. Weight, 150 pounds,	28 00

FIG. 1484.



PRENTISS' NEW "BULL DOG" VISES.
Best plain vises made.

FIG. 1486.



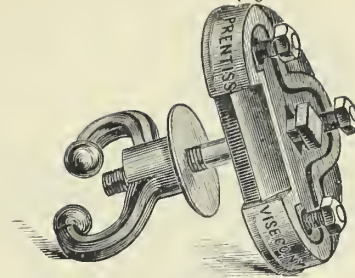
PRENTISS' "BULL DOG" STATIONARY BOTTOM, MACHINISTS' SOLID JAW, PARALLEL VISE.

No.		Price.
50.	Stationary bottom. 3¼ inch jaws. Opens 4 inches. Weight, 22 pounds,	\$6 00
51.	Stationary bottom. 3½ inch jaws. Opens 5 inches. Weight, 28 pounds,	7 00
52.	Stationary bottom. 4¼ inch jaws. Opens 5½ inches. Weight, 42 pounds,	8 50
53.	Stationary bottom. 4¾ inch jaws. Opens 6¼ inches. Weight, 52 pounds,	10 00
54.	Stationary bottom. 5 inch jaws. Opens 7 inches. Weight, 72 pounds,	13 00
55.	Stationary bottom. 5½ inch jaws. Opens 8½ inches. Weight, 100 pounds,	18 50
56.	Stationary bottom. 6 inch jaws. Opens 9½ inches. Weight, 135 pounds,	25 00

SWIVEL BOTTOM, MACHINISTS' SOLID JAW PARALLEL VISE.

No.		Price.
90.	Swivel bottom 3¼ inch jaws. Opens 4 inches. Weight, 28 pounds,	\$7 50
91.	Swivel bottom. 3½ inch jaws. Opens 5 inches. Weight, 36 pounds,	8 75
92.	Swivel bottom. 4¼ inch jaws. Opens 5½ inches. Weight, 52 pounds,	10 50
93.	Swivel bottom. 4¾ inch jaws. Opens 6¼ inches. Weight, 64 pounds,	12 50
94.	Swivel bottom. 5 inch jaws. Opens 7 inches. Weight, 85 pounds,	16 00
95.	Swivel bottom. 5½ inch jaws. Opens 8½ inches. Weight, 115 pounds,	22 00
96.	Swivel bottom. 6 inch jaws. Opens 9½ inches. Weight, 155 pounds,	30 00

FIG. 1485.

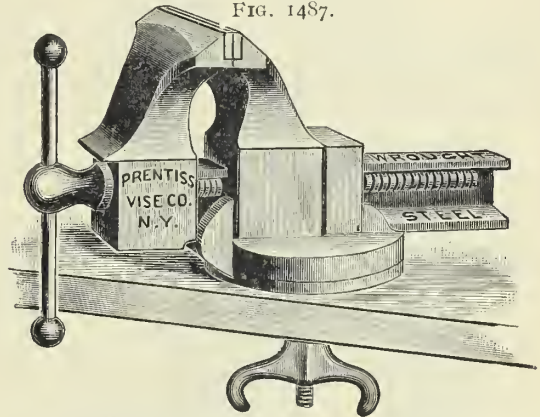


NEW SWIVEL BOTTOM ATTACHMENT.

By use of which all sizes of our Stationary Bottom rapid transit vises may be changed to swivel bottom vises. Prices including bolts and nuts.

For Vise.	Each.	Per Vise.	Each.
No. 70, - - -	\$1.00	No. 74, - - -	\$2.50
No. 71, - - -	1.50	No. 75, - - -	3.25
Nos. 72 and 73, - - -	1.75	No. 76, - - -	1.75

FIG. 1487.

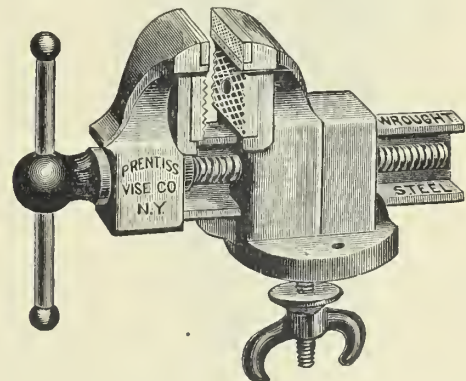


PRENTISS' NEW STEEL (CHANNEL) BAR FILERS' VISES.—SWIVEL BOTTOM.

Our wrought iron steel (channel) sliding bar renders it possible to construct this vise with the highest jaws and largest throat opening of any vise ever before offered, thus holding the largest and most complicated work, being particularly adapted to bicycle manufacturing and repair shops.

Rough cut or smooth jaws, as ordered.
No. 48. Swivel bottom. 4 inch jaws. Opens 6 inches.
Weight, 45 pounds, - - - \$8.00

FIG. 1488.

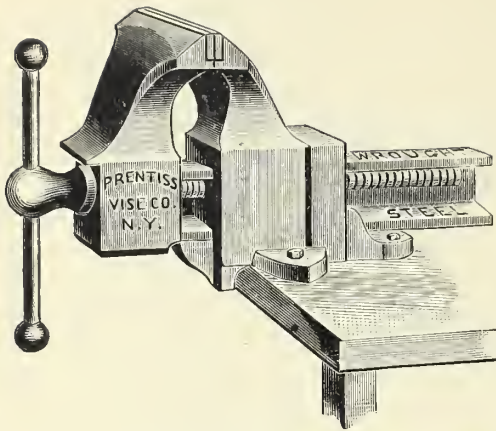


PRENTISS' IMPROVED COMBINATION PIPE VISES.

Pipe may be held at various angles and a slight turn of lever releases it. Capacity greater than other vises.

No.		Each.
81.	Jaws 3½ in., holds ¼ to 2½ in. pipe. Weight, 35 lbs.,	\$16 00
82.	Jaws 4¼ in., holds ½ to 4 in. pipe. Weight, 55 lbs.,	20.00
83.	Jaws 5 in., holds ¾ to 6 in. pipe. Weight, 100 lbs.,	30.00

FIG. 1489.

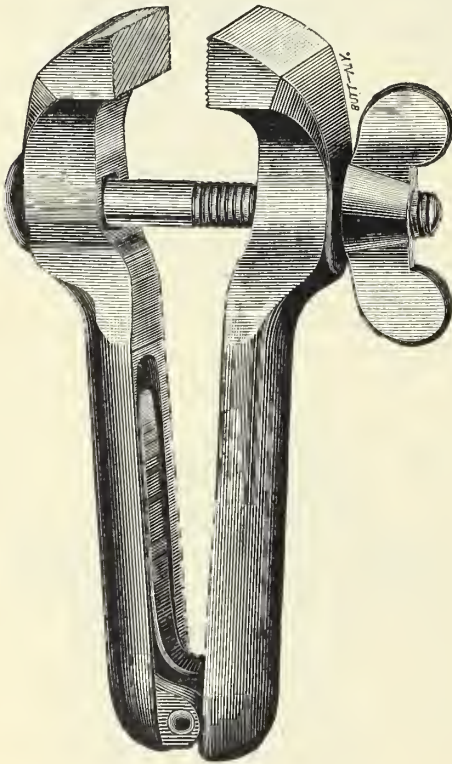


PRENTISS' NEW STEEL (CHANNEL) BAR FILERS' VISES.—STATIONARY BOTTOM.

The Prentiss is absolutely as inflexible and rigid as though made with cast iron slide, thus insuring the user a parallel vise that will not spring nor break. The nut is fastened in the center of vise body, giving a maximum grip with minimum friction and strain.

No. 43. Stationary bottom, 4 inch jaws. Opens 6 inches. Weight, 37 pounds. \$7.00

FIG. 1491.

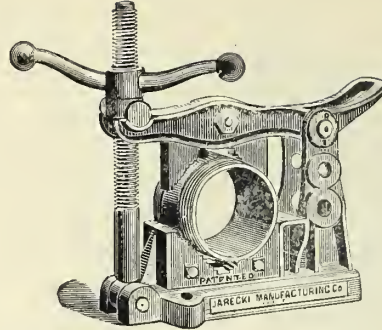


HAND VISE, No. 3.

This vise is made of solid steel castings, well tempered, with a heavy spring inside to open the jaws, which are closed with a bolt and nut, as seen in the cut. It has a blue finish with polished jaws. The jaws are 1½ inches wide, and open 1½ inches. Length of vise, 5 inches. Weight one pound.

Price, per dozen, - - \$9 00

FIG. 1490.

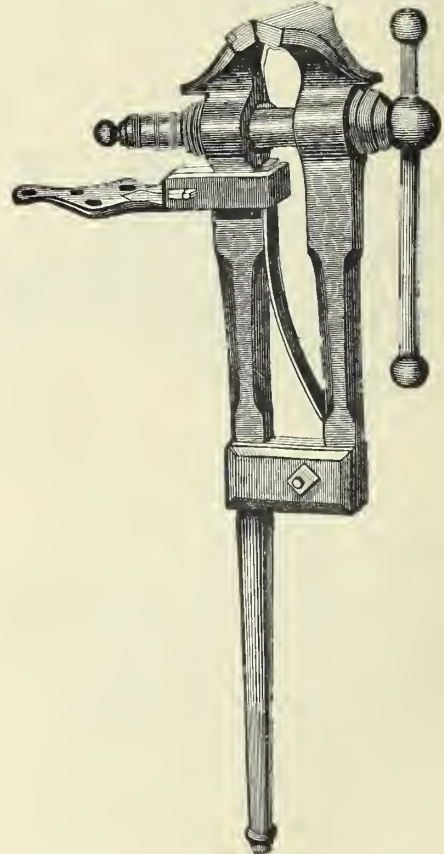


PATENT PIPE VISE.

It will be seen by referring to the cut of this vise, that the beams which holds the upper jaw is hinged. By this improvement the pipe can be placed in the vise at any point. The side opening has other advantages, that the vise may be used for holding pipes while fittings are screwed on one or both ends, or for taking apart old pipe work.

No. Takes	1 A	2 A	3 A	4 A
Price,	½ to 2 \$12.00	½ to 4 16.00	1½ to 6 24.00	6 to 12 60.00

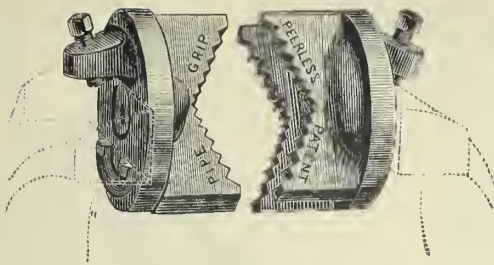
FIG. 1492.



WROUGHT IRON			SOLID BOX VISES.		
Width of Jaw.	Weight about.	Price.	Width of Jaw.	Weight about.	Price.
3¼ inches.	35 pounds.	\$10 00	6 inches.	110 "	\$22 00
4 "	40 "	10 50	6 "	115 "	24 00
4½ "	45 "	11 00	6½ "	120 "	25 00
4¾ "	50 "	11 50	6½ "	125 "	26 00
5 "	55 "	12 00	6½ "	130 "	27 50
5¼ "	60 "	13 00	6½ "	140 "	29 00
5½ "	65 "	14 00	7 "	150 "	33 00
5¾ "	70 "	15 00	7 "	160 "	36 00
6 "	75 "	16 00	7¼ "	170 "	41 50
6½ "	80 "	17 50	7½ "	180 "	44 50
7 "	85 "	18 50	7¾ "	190 "	47 00
7½ "	90 "	20 00	8 "	200 "	53 00
8 "	95 "	21 00			56 00

In ordering solid box vises, give width of jaw and approximate weight.

FIG. 1493.

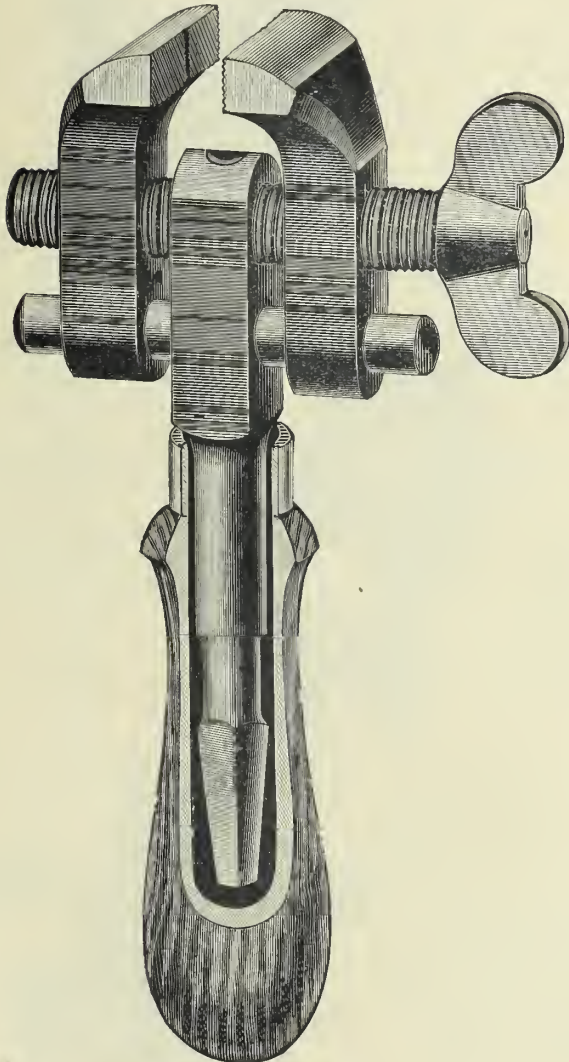


NEW PEERLESS PATENT PIPE GRIP.

New Improved (Swivel Jaw) Pipe Grip, "Peerless." Made of steel.

No. 1.	Fits any 3 to 4½ inch vise, will hold ¼ to 2½ inch pipe,	\$2.50
No. 2.	Fits any 4¾ to 5½ inch vise, will hold ¼ to 5 inch pipe,	2.75
No. 3.	Fits any 6 to 8½ inch vise, will hold ¼ to 6 inch pipe,	3.00

FIG. 1494.



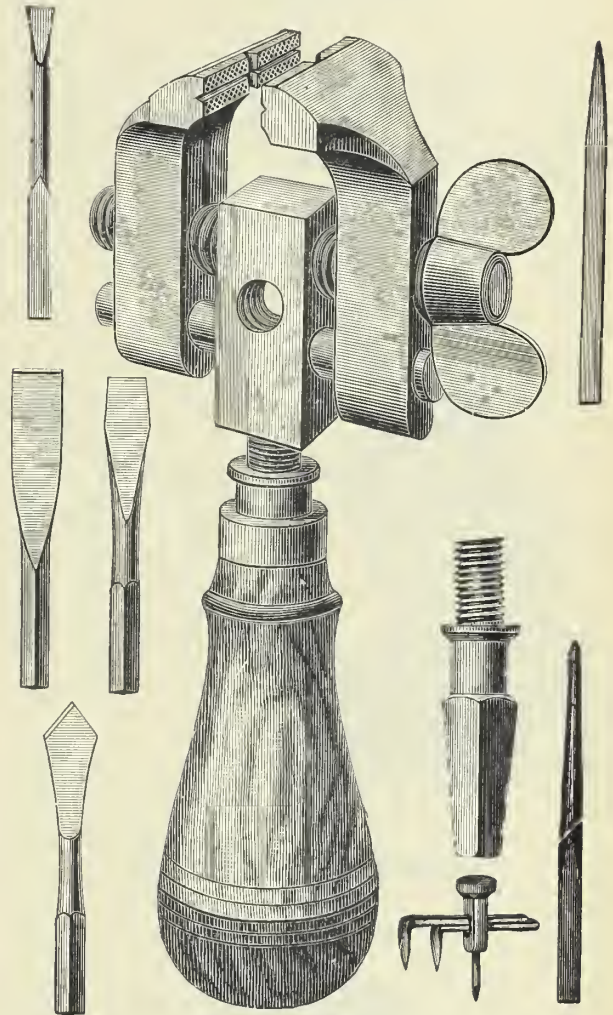
HAND VISE.

This is a forged steel vise, with a cocobola handle. It is blue finish with polished jaws. As seen in the cut the handle may be taken off and the shank placed in a bit brace. The jaws are creased to hold a twist drill. It may be used as a vise, wrench or drill chuck. It is a very substantial tool.

Width of jaws, 1½ inches; diameter of screw, ½ inch; length over all, 6¾ inches; jaws open, 1¼ inches; width of thumb nut, 1¾ inches; weight, 17 ounces.

Price, - - - - - per dozen, \$18 00

FIG. 1495.



ALFORD HAND VISE.

The jaws are of forged and tempered steel, the screw and cross-bar are also made of steel, the handle is made of rosewood with lignumvitæ cap. It is hollow, and the bit shank and tools seen in the cut are placed inside. The blades bent at right angle are used for cutting washers.

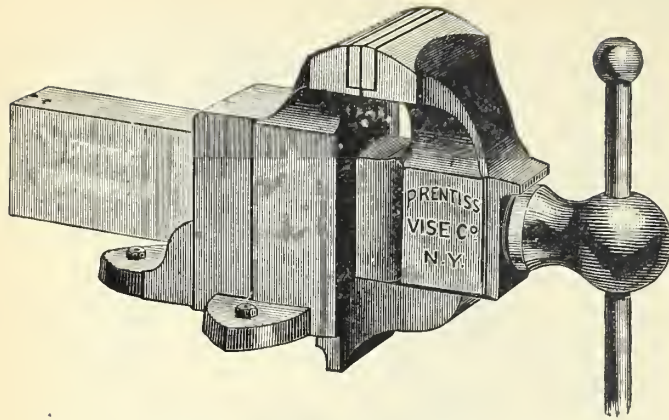
The vise jaws are 1¼ inches wide and open 1½ inches. They will center and hold tools firmly of any shape. The vise is one-third larger than the cut, while the tools are full size. The handle can be unscrewed from the vise and the bit shank put in its place, to be used with a bit brace for any kind of boring, drilling or cutting washers. The handle can also be screwed into the vise at right angles with its usual position, which is desirable for many kinds of work.

Price, with all the tools, - - - per dozen, \$21 00

FIG. 1496.

VISES—Continued.

FIG. 1497.

**PRENTISS' HEAVY CHIPPING VISE.**

This is the largest and heaviest vise in the market, and possesses all the requisites to meet the heavy demands made upon a vise of this class in railroad and machine shops, foundries, glass works, mills and large manufactories.

No. 58. 8½ inch jaws. Opens 12 inches, Weight, 275 pounds, Price, \$50.00
Swivel bottom attachment for this vise, \$5.00

FIG. 1498.

MALLEABLE IRON HINGED PIPE VISE.

No.	Takes Pipe.	Price.
10	⅛ to 2½ inches	\$10.00
12	½ to 4½ inches	20.00

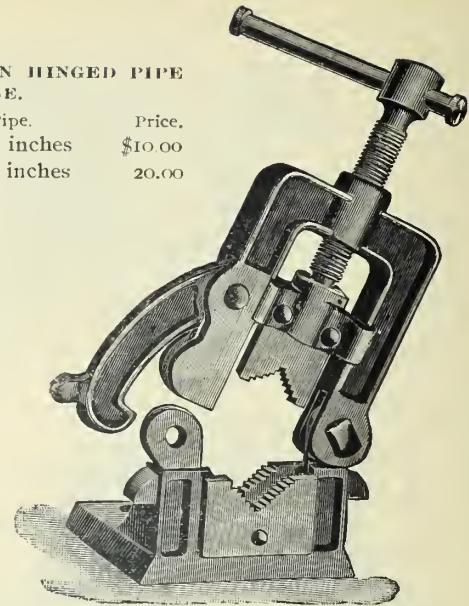


FIG. 1499.

MALLEABLE IRON HINGED PIPE VISE.

No.	Takes Pipe.	Price.
3	⅛ to 2 inches	\$10.00
5	⅛ to 3 inches	14.00
6	¼ to 4 inches	20.00
7	1 to 6 inches	36.00

We make angle plates for Nos. 5 and 6.

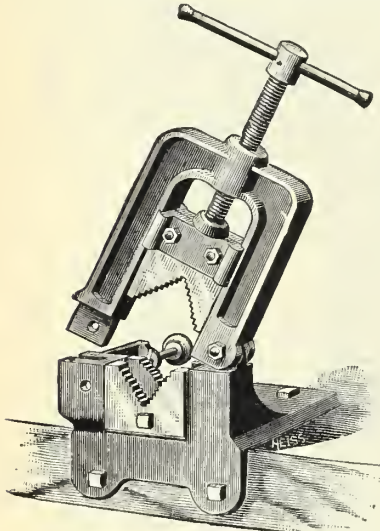


FIG. 1500.

MALLEABLE IRON HINGED PIPE VISE.

HEAVY PATTERN.
No. Takes Pipe. Price.
1, ⅛ to 2½ in., \$10.00
2, ⅛ to 3½ in., 14.50

LIGHT PATTERN.
1 E., ⅛ to 2 in., 8.00
2 E., ⅛ to 3 in., 12.00

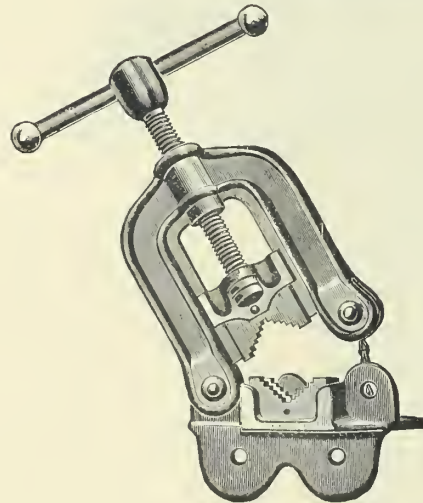
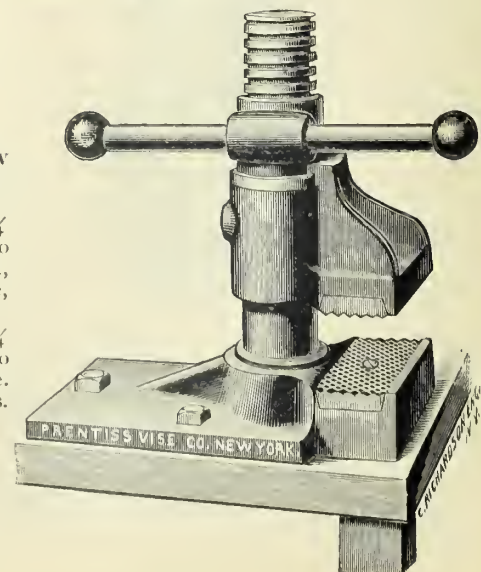


FIG. 1501.

PRENTISS' NEW OPENSIDE PIPE VISES.

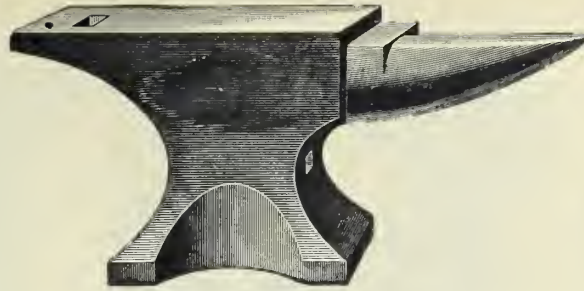
No. 86, jaws 3¼ inches, holds ⅛ to 3 inch pipe. Weight, 18 pounds. Price, \$10.00.

No. 88, jaws 4¼ inches, holds ⅛ to 4½ inch pipe. Weight, 40 pounds. Price, \$16.00.

**MALLEABLE IRON HINGED PIPE VISE.**

No.	Takes Pipe.	Price.
0,	⅛ to 2 inches,	\$8.00

FIG. 1502.

**EAGLE ANVILS.**

Cast Iron, with Patent Double Thick Steel on Both Edges of Face, Whole Length.

BLACKSMITHS'.

Weight. Pounds.	FACE.			HORN.
	Length. Inches.	Width. Inches.	Cutter-Hole Square. Inches.	Length. Inches.
100	12	3½	¾	8½
110	12¾	3½	¾	8½
120	12¾	3½	¾	8½
130	13½	3¾	¾	8½
140	14	4	¾	8½
150	14½	4	¾	10
150	15	4	¾	10
160	15	4¼	1	10
170	15	4¼	1	10
180	15½	4¼	1	10
200	16½	4¾	1½	11½
225	16½	4¾	1½	11½
250	17¼	5¼	1¾	11½
275	17¾	5¼	1¾	11½
300	19	5¼	1¾	11½
350	20	6	1¾	13
400	21	6	1¾	13
500	23	6½	1½	14½
600	23	6½	1½	14½

AXE MAKERS'.

Weight. Pounds.	Length. Inches.	Width. Inches.	Height. Inches.
150	9½	4¾	10
165	10	4	10¼
175	10	4½	10¼
225	12	4¾	11½
260	14	4¾	11

CUTLERS'.

Two steel slots.

440	19	5½	14
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Horn 8 inches long—3 steel slots.

300	17	5	12
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FILE MAKERS'.

Two steel slots.

400	19½	5½	13
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CHAIN MAKERS'.

Number.	Weight. Pounds.	Face. Inches.	Horn. Inches.
1	90	9 x 3½	4½
2	115	8 x 3	5 double
3	220	14 x 4	4¼ double
4	325	18 x 4½	4½ double
5	360	16 x 5¼	9
6	275	16 x 4½	
7	675	22 x 6½	
8	750	25 x 6½	
9	1000	26 x 7	

EVERY ANVIL WARRANTED.**PETER WRIGHT'S ANVILS.**

Weights from 84 to 500 pounds,				— cents per pound.	
"	"	70	84	advance,	1
"	"	60	70	"	1½
"	"	50	60	"	2
under 50 pounds,				"	3

SMALL ANVILS (MINIMS.)

No.	ooo	-	-	-	-	2¼	1½	—	1½
"	1	-	-	-	-	5¾	1¾	¾	3½
"	2	-	-	-	-	6¼	2¼	½	4
"	3	-	-	-	-	7¼	2½	½	4
"	4	-	-	-	-	8¾	3	¾	5¼
"	5	-	-	-	-	9¼	3	¾	6½
"	6	-	-	-	-	10	3	¾	6½
"	7	-	-	-	-	10½	3¼	¾	7½
"	8	-	-	-	-	10½	3¼	¾	7½
"	9	-	-	-	-	11	3¼	¾	7½

ARMITAGE MOUSE HOLE ANVILS.

Weights from 84 to 500 pounds,				— cents per pound.	
"	"	65	84	advance,	1
"	"	50	65	"	1½

AMERICAN HORSE SHOER ANVIL.

Price,	-	-	-	-	-	— cents per pound.	
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FISHER PLOW MAKERS.

Weight. Pounds.	FACE.			HORN.
	Length. Inches.	Width. Inches.	Cutter-Hole Square. Inches.	Length. Inches.
190	17½	4¼	1	10½

BIT MAKERS'.

Two steel slots.

1	350	6 x 5	6 long.
---	-----	-------	---------

WROUGHT IRON, STEEL FACE ANVILS.

In all patterns, from 50 to 500 pounds,				— cents per pound.	
---	--	--	--	--------------------	--

*Horseshoer's
Special.

BLACKSMITH TOOLS.

FIG. 1503.



Fullers, Top and Bottom. 50c. per lb.

FIG. 1504.

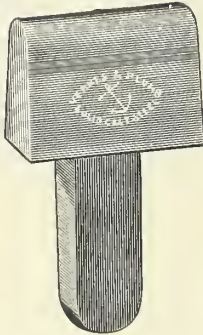


FIG. 1505.



Swedges, Top and Bottom. 50c. per lb.

FIG. 1506.

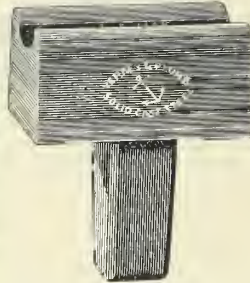
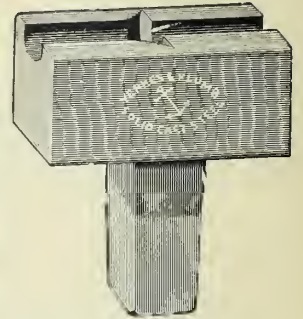


FIG. 1507.

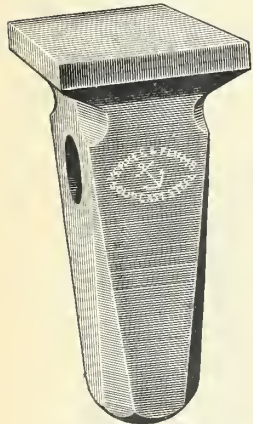


FIG. 1508.



Collar Swedges, Top and Bottom, 60c. per lb.

FIG. 1509.



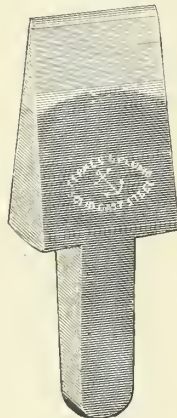
Flatters.
50c. per lb.

FIG. 1510.



Set Hammers.
50c. per lb.

FIG. 1511.



Hardies.
50c. per lb.

FIG. 1512.

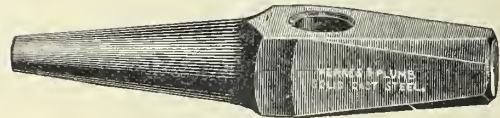
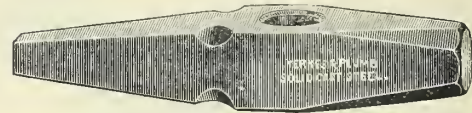
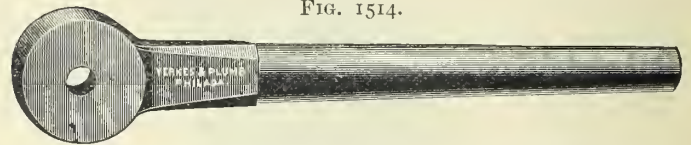


FIG. 1513.



Blacksmiths' Punches. (Round and Square.)
Round, - - per lb., 55c. Square, - - per lb. 55c.

FIG. 1514.



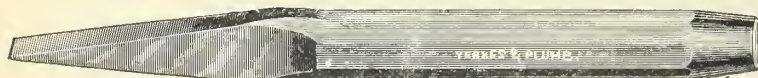
Blacksmiths' Heading Tools. Per lb., 50c

FIG. 1515.



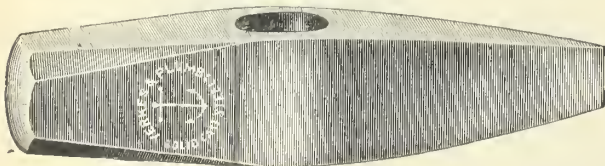
Size, -	-	1/4	3/8	1/2	3/4	7/8	1	8 inches long.
Price, -	-	.30	.35	.35	.40	.50	.55	.60 cents each.

FIG. 1516.



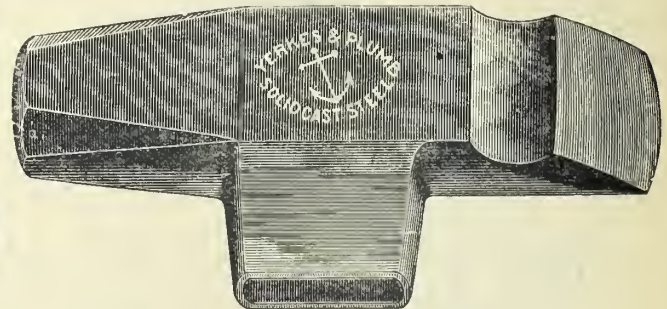
Size, -	-	3-16	1/4	5-16	3/8	1/2	5/8	3/4	8 inches long.
Price, -	-	.35	.40	.50	.60	.70	.80	.90	cents each.

FIG. 1518.



Cold Chisel. Per lb. 50 cents. Hot Chisels, same price.

FIG. 1517.



Blacksmiths' Crcasers, Adze Eye. Per doz., \$10.00-

FIG. 1519.



Plugs and Feathers. Weight, 4 to 6 ounces. Per lb., 40 cents.

BLACKSMITHS' TONGS.

Fig. 1520.

FIG 1521.

FIG. 1523.

FIG. 1522.

FIG. 1525.

FIG. 1526.

FIG. 1527.

FIG. 1528.

FIG. 1524.

Gad.
40c. per lb.

Single Pick Up.
40c. per lb.

Round Jaw.
40c. per lb.

Angle Jaw.
60c. per lb.

Clip.
\$1.20 per lb.
FIG. 1529.

Bolt.
40c. per lb.

Rivet.
60c. per lb.

Pick.
60c. per lb.

Lathe Tool.
60c. per lb.



STRAIGHT LIP TONGS.

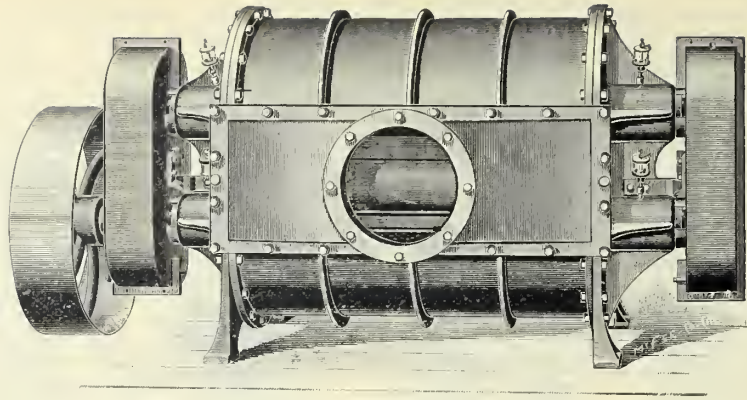
No.	Length	Per doz.	No.	Length	Per doz.	No.	Length	Per doz.	No.	Length	Per doz.
1330	12 inches	\$5.75	1331	14 inches	\$6.75	1332	16 inches	\$7.75	1333	18 inches	\$8.75
1335	" 22 "	11.00	1336	" 24 "	12.50	1337	" 26 "	14.00	1338	" 28 "	15.75
									1339	" 30 "	17.50

FIG. 1530.



CURVED LIP, FLUTED JAW.

No.	Length	Per doz.	No.	Length	Per doz.	No.	Length	Per doz.	No.	Length	Per doz.
1340	12 inches	\$6.50	1341	14 inches	\$7.50	1342	16 inches	\$8.50	1343	18 inches	\$9.50
1345	" 22 "	12.00	1346	" 24 "	13.50	1347	" 26 "	15.00	1348	" 28 "	17.00
									1349	" 30 "	19.00



ROOT'S FOUNDRY BLOWERS.

Root's Rotary Positive Pressure Blower stands without an equal in design, construction, operation, simplicity, efficiency, durability and economy of power.

Every part is as accurately finished as it is possible for the latest improved machinery and skilled labor to do the work. The blast can be discharged in any direction, as we construct these blowers with top, bottom or side discharge. We also fit them up with one or two pulleys, or with one or two engines as required. For all kinds of general, and some special work, we recommend one pulley or one engine.

During the last few years we have fitted up a great many of our blowers and pumps with electric motors on same bed-plate. This makes a very compact and desirable arrangement in a great many cases, and we are always pleased to furnish plans and estimates on any of these blowers or pumps fitted in this manner.

SPEEDS AND CAPACITIES OF OUR BLOWERS FOR CUPOLAS.

No. $\frac{1}{2}$ Blower.—Adapted to a cupola 21 to 24 inches inside lining.

Discharges $1\frac{1}{2}$ cubic feet per revolution.

400 revolutions per minute will melt	1 1-5 tons per hour.
445 " " " "	1 1-3 " "
500 " " " "	1 1-2 " "

No. 1 Blower.—Adapted to a cupola 24 to 28 inches inside lining.

Discharges 3 cubic feet per revolution.

350 revolutions per minute will melt	2 1-10 tons per hour.
390 " " " "	2 1-3 " "
445 " " " "	2 2-3 " "

No. 2 Blower.—Adapted to a cupola 28 to 32 inches inside lining.

Discharges 5 cubic feet per revolution.

320 revolutions per minute will melt	3 1-5 tons per hour.
375 " " " "	3 3-4 " "
420 " " " "	4 1 5 " "

No. 3 Blower.—Adapted to a cupola 32 to 42 inches inside lining.

Discharges 8 cubic feet per revolution.

270 revolutions per minute will melt	4 1-3 tons per hour.
325 " " " "	5 1-6 " "
375 " " " "	6 " "

No. 4 Blower.—Adapted to a cupola 42 to 45 inches inside lining.

Discharges 13 cubic feet per revolution.

240 revolutions per minute will melt	6 1-3 tons per hour.
280 " " " "	7 1-3 " "
330 " " " "	8 2-3 " "

No. 5 Blower.—Adapted to a cupola 48 to 54 inches inside lining.

Discharges 22 cubic feet per revolution.

205 revolutions per minute will melt	9 tons per hour.
250 " " " "	10 1-2 " "
285 " " " "	12 1-2 " "

No. 6 Blower.—Adapted to a cupola 60 to 72 inches, or two 42 to 48 inches inside lining. Discharges 37 cubic feet per revolution.

175 revolutions per minute will melt	13 tons per hour.
215 " " " "	16 " "
260 " " " "	19 " "

No. 7 Blower.—Adapted to a cupola 72 to 84 inches, or two 48 to 54 inches inside lining. Discharges 63 cubic feet per revolution.

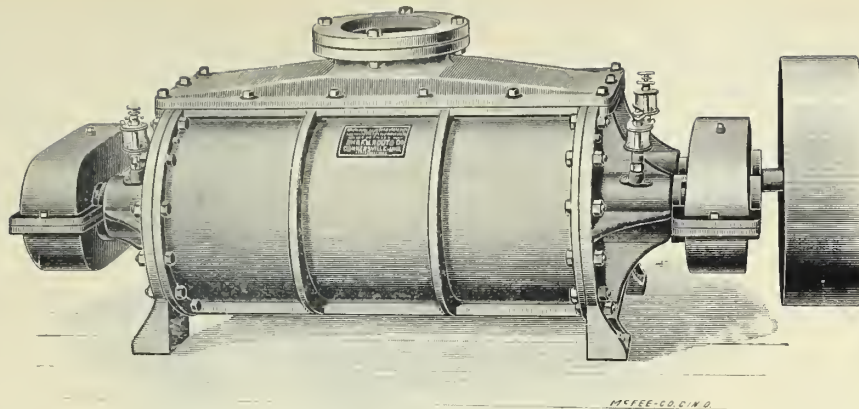
150 revolutions per minute will melt	19 tons per hour.
175 " " " "	22 " "
200 " " " "	25 " "

No. 8 Blower.—Adapted to a cupola 78 to 84 inches, or two 60 to 66 inches inside lining. Discharges 116 cubic feet per revolution.

100 revolutions per minute will melt	23 1-5 tons per hour.
125 " " " "	29 " "
150 " " " "	34 2-3 " "

No. 9 Blower.—Adapted to two cupolas 60 to 72 inches, or two 78 to 84 inches inside lining. Discharges 197 cubic feet per revolution.

75 revolutions per minute will melt	29 1-2 tons per hour.
100 " " " "	39 1-2 " "
125 " " " "	49 " "



ROOT'S HIGH PRESSURE BLOWER.

THE New Rotary Positive Pressure Blowers have such form, and the system by which they are dressed is such that they are susceptible of being finished with such accuracy that they will maintain a mathematically accurate contact with each other, and the case, during the entire revolution. Owing to this perfect contact of the pistons with each other, and a number of other improvements which have been recently patented, we are enabled to obtain a much higher pressure than with the old style blowers. With this improved construction, we can obtain without difficulty a pressure of ten (10 pounds) per square inch, and we would not hesitate to undertake to build blowers that would give a still higher pressure than this; the matter resolves itself simply into questions of the strength and accuracy of the blower and the power necessary to operate it. It will be apparent however at once, that to give such high pressures as those named above, the internal operating parts must be fitted to work together with the utmost accuracy, and that all the parts must have weight and strength, corresponding with the work to be done, which, of course, will add to its cost in a corresponding ratio. But a rotary blower capable of giving the pressures named above, will have advantages that will much more than compensate for the additional cost. Among those that might be named are the following:

1st. On account of their rotary motion and the higher speed at which they may be run, and their compactness, they have a much greater capacity in volume of air discharged, as compared with size and space occupied, than blowing cylinders. This, for many purposes, is almost a vital consideration, especially where it is necessary that they should be portable; as, for elevating and transferring grain from one car to another, or into storage houses, or from vessels to canal boats, or vice versa.

2d. With rotary blowers, valves, or their equivalents, are unnecessary, while with piston blowers they are indispensable. This greatly simplifies their construction.

3d. As the rotary blower dispenses with valves and receivers, and is direct in its action, it is much simpler in its construction, and is also much more compact in form, and will bear a higher speed; it will, therefore, for any given size of blower, discharge a much larger volume of air than any other style. We are able, therefore, to build a blower capable of doing any given work, for a less price than blowing cylinders of the same capacity can be built.

An important feature in the construction of our blower is that all parts requiring attention are external, visible, and easily accessible. As before stated, the internal operating parts do not run in actual contact, and, therefore, require no attention beyond occasional lubrication. The wear is all confined to the journal and gears, and all changes, adjustments and renewals can be made from the outside, while in other blowers these parts are internal, and can only be reached by taking the machine apart, and putting it together again. A little consideration will show the advantage and importance of this arrangement.

1st. It is simpler than any other blower.

2d. It is the only positive rotary blower made with impellers constructed on correct principles.

3d. It is the best because it has stood the test of years and is the result of long experience.

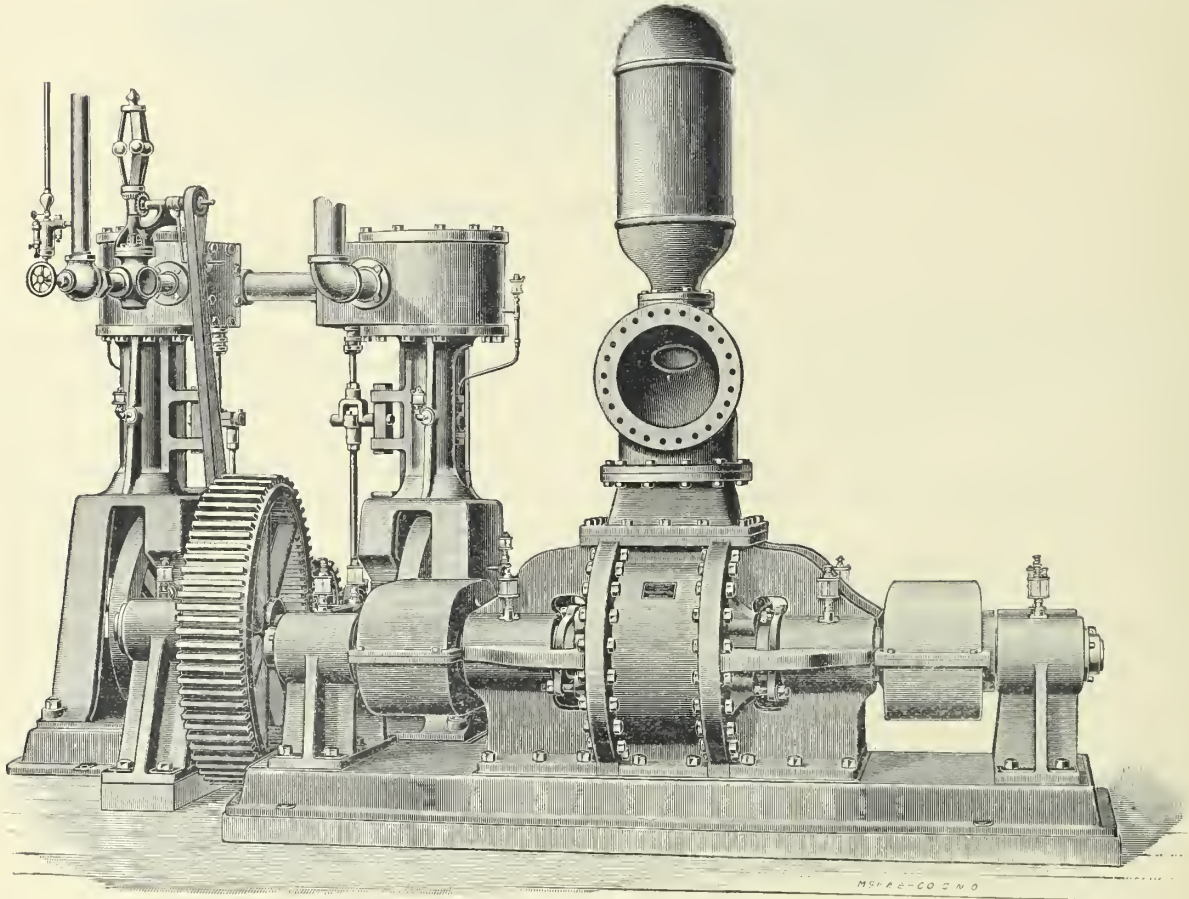
4th. In case of wear of the journals the impellers will not come together and break or consume unnecessary power, as is the case with competing machines.

5th. The principles upon which our blowers are constructed admit of more perfect mechanical proportions than any other.

6th. The only perfectly adjustable journal box for this type of machine is used.

PRENTISS TOOL & SUPPLY CO.

FIG. 1533.



ROOT'S FOUNDRY BLOWER WITH ENGINE.

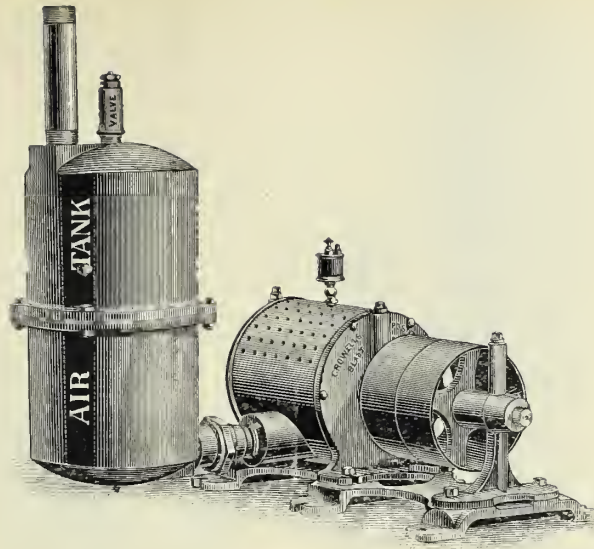
BLOWER AND ENGINE COMBINED ON SAME BED PLATE.

DURING the past ten years the manufacturer has spent a great deal of time and money in perfecting the Rotary Force Pump. We have found, after testing in a practical way, under exactly the same conditions, what seemed to be the best forms of pistons for rotary force pumps, that the form of piston we illustrate herewith is immensely superior, in simplicity, durability, efficiency and economy of power—the four most essential elements to embody in any machine—to any other form of rotary pump. They have gone further: they have found that with the pump they can guarantee a higher percentage of useful effect, and a greater saving in the consumption of coal than any other pump made, whether rotary or reciprocating.

For irrigating purposes it is “par excellence,” and for any other purpose where a pump is required we guarantee it in every particular. By means of a coupling, spur or mortise gears, it is easily connected direct or by belt or gear, thus constituting a plain, simple pumping station, and one as highly efficient and economical as any pumping plant in existence.

In offering this pump to the public, it is done so after an experience of thirty-six years in the construction of machines of the rotary type—after the most exhaustive practical tests, and after subjecting it to years of service in all kinds of work; and we unhesitatingly assert that to-day they offer the most perfect rotary pump—and in some respects and for certain purposes the most perfect pump (whether rotary, reciprocating or centrifugal) on the market.

FIG. 1534.



IMPROVED PATTERN POSITIVE PRESSURE BLOWER OR ROTARY AIR PUMP.

These Blowers are in successful operation in many branches of business, and are being used for many classes of work, such as :—

Soldering—Brazing—Sand Blast—Melting of Metals—Glass Work—Agitating Liquids—Atomizers—Court-Plaster—Increasing Draft or Ventilation—Piano Cleaning, and for many other uses, where air at a certain pressure is required.

SPEED.—As this blower gives a positive blast, measuring and forcing a certain amount of air at each revolution, it is important that the speed should be regulated as per table below.

AIR PIPES —The size of air pipe to convey the air should be as large as the nipple or short pipe that is fitted in each blower. It is of great importance in all blowers that the conducting pipes should not only be of suitable size, but should be free from elbows or turns as much as possible, as all tend to resist the passage of air and create friction, thereby making it necessary to increase the power to force the air around the short turns, or through the small passage or small pipes. And this increase of friction, caused by small pipes, bends and elbows, is both unnecessary and expensive.

DIRECTIONS FOR RUNNING.—The friction of this blower is confined to the bearings for the shaft, also to the cylinder in which the fans revolve.

To oil the shaft, unscrew the plugs in each head and drop in a candle, such as are sent with every machine. Screw the plugs in tight again.

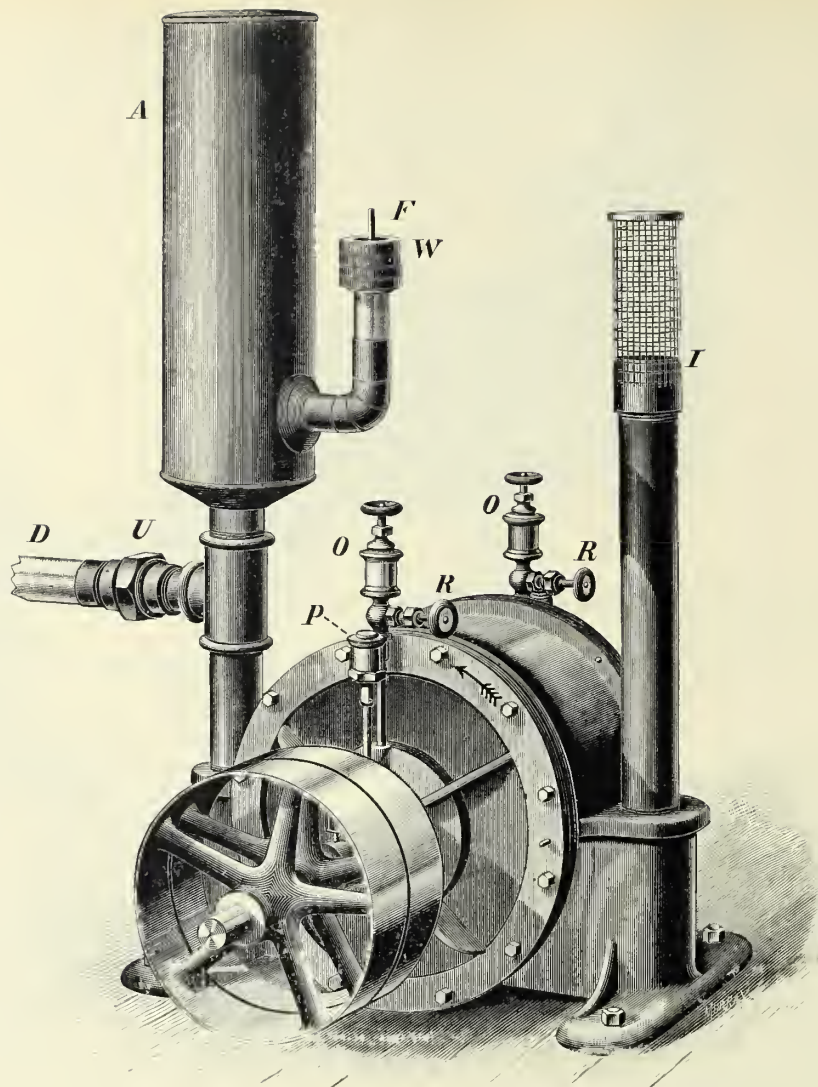
These candles will last about one week, when a new candle should be put in each receiver.

To oil the cylinder, the sight feed oil cup on top of the machine should be filled with heavy oil (such as cylinder oil), and set the screw on cup at about No. 3 or 4, so as to feed one drop of oil about every five minutes, which is all the machine requires.

By ordinary attention to oiling, the blower will keep in perfect running condition.

SPECIFICATIONS.

Number of Blower.	Diameter of Cylinder.	Diameter of Pulleys.	Face of Pulleys.	Revolutions per Minute.	Horse-Power Required.	Cubic Inches Delivered per Revolution.	Pressure to
1	4½ inches.	3 inches.	1 inch.	600	⅛	15 inches.	8 pounds.
2	6 "	4 "	1½ "	400	¼	40 "	"
3	8 "	5 "	2½ "	300	½	90 "	"
4	8 "	7 "	3 "	250	1	200 "	"
5	12 "	10 "	3 "	250	1	400 "	"
6	12 "	12 "	4 "	250	1½	600 "	"



HIGH PRESSURE BLOWER No. 3.

THIS machine was designed to produce a forced blast of any desired pressure, but more especially to deliver a steady and continuous air blast of greatest possible volume under a pressure per square inch of from one-half ($\frac{1}{2}$) to two (2) pounds, variable according to requirements. It is practically noiseless in operation, runs at moderate speed, and requires less power than other machines of the same capacity.

While more especially designed for operating oil gas machines and gas blast furnaces, the Blower is applicable wherever a steady air blast under definite pressure is needed.

These machines are now made in six regular sizes as per table on following page, and for any other desired capacity and pressure "to order."

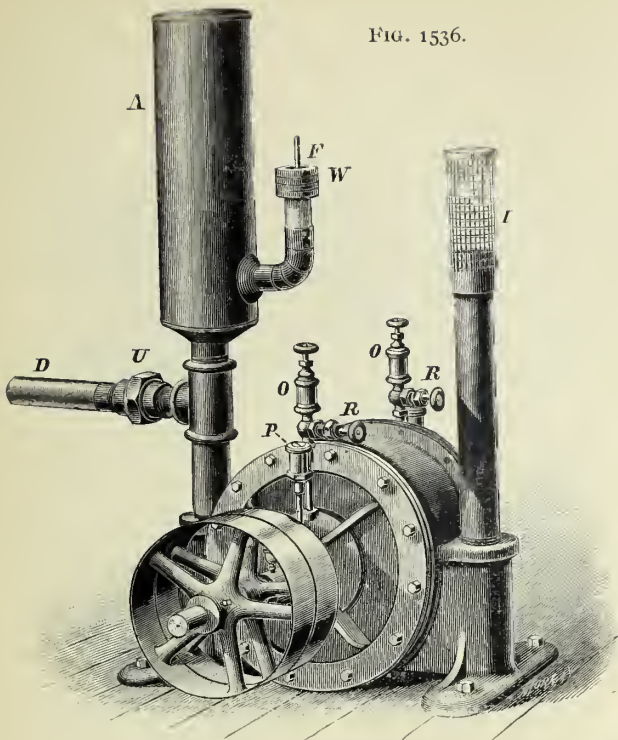
Where wanted to replace some other blower or air compressor, we warrant satisfaction when correctly advised respecting the required pressure and volume of discharge.

We warrant the perfect working of this Blower for two years, during which period we will remedy promptly any defect disclosed, at our own expense, provided directions for placing and operating the Blower, sent with invoice, are strictly complied with.

We claim that no other blower will equal it for economy in power, and that it is the smallest and most compact machine now in the market, for equal capacity.

Barring mechanical defects from imperfect workmanship, against which we insure our patrons, there can be no clatter, thumping or other noises, except that incident to the escape of compressed air from a relief valve, and this can be removed if desired. With proper lubrication, which is amply provided for by four oil cups to be regularly filled, we assume no risk in warranting the proper working of this Blower for several years, because the possibility of a derangement lies in minor working parts only, such as the guide blocks G, and pivot pin P, which are easily renewed at small cost if necessary.

FIG. 1536.



PRICE LIST AND CAPACITY OF BLOWERS.

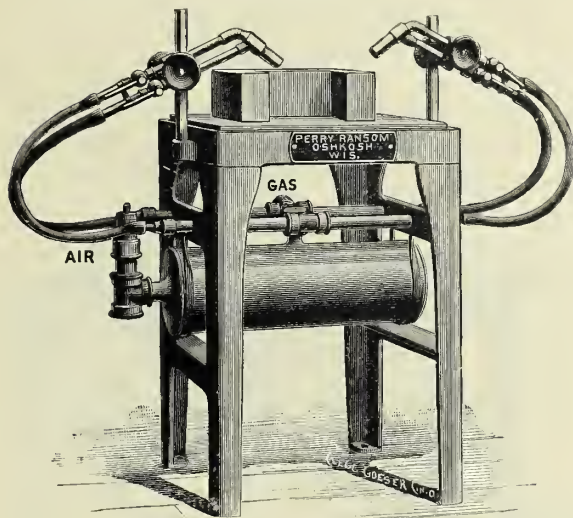
The following table shows the working capacity of each blower at the proper normal speed, the number of cubic inches of air moved by each revolution, and the exact size of the open round nozzle through which it will discharge into the air, under different pressures, stated in pounds to the square inch.

Size.	Capacity in Cubic Inches.	Speed Revo- lutions per Minute.	DISCHARGE UNDER PRESSURE OF :				
			$\frac{1}{2}$ Lb. to Sq. In.	$\frac{3}{4}$ Lb. to Sq. In.	1 Lb. to Sq. In.	$1\frac{1}{2}$ Lb. to Sq. In.	2 Lb. to Sq. In.
1	450	250	$\frac{29}{8}$ in.	$\frac{7}{8}$ in.	$\frac{13}{16}$ in.	$\frac{11}{16}$ in.	$\frac{5}{8}$ in.
2	675	250	$1\frac{1}{8}$ in.	$1\frac{1}{8}$ in.	1 in.	$\frac{15}{16}$ in.	$\frac{25}{32}$ in.
3	1320	200	$1\frac{7}{16}$ in.	$1\frac{5}{8}$ in.	$1\frac{1}{4}$ in.	$1\frac{1}{8}$ in.	$\frac{31}{32}$ in.
4	1980	200	$1\frac{3}{4}$ in.	$1\frac{7}{8}$ in.	$1\frac{7}{8}$ in.	$1\frac{5}{8}$ in.	$1\frac{1}{4}$ in.
5	3564	190	$2\frac{11}{16}$ in.	$2\frac{5}{8}$ in.	$2\frac{1}{8}$ in.	$1\frac{3}{4}$ in.	$1\frac{9}{16}$ in.
6	5346	190	$2\frac{7}{8}$ in.	$2\frac{31}{32}$ in.	$2\frac{1}{8}$ in.	$2\frac{5}{8}$ in.	$1\frac{15}{16}$ in.

Nos.	1	2	3	4	5	6
Price,	\$75 00	100 00	150 00	215 00	320 00	425 00

NOTE.—This table is made from actual test of several blowers of each size.

FIG. 1537.



BICYCLE BRAZING TABLE.

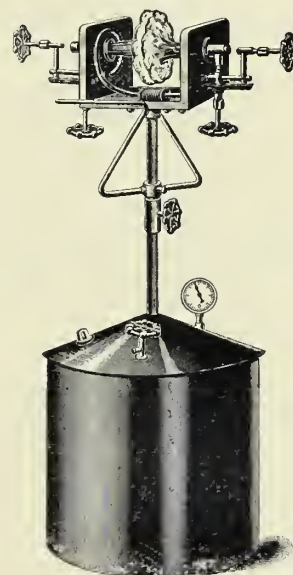
This machine has a very large table 20 x 22 inches, which is covered with fire brick $2\frac{1}{2}$ inches thick. This large size of table admits of placing the work to the best advantage and leaves plenty of room for fire brick to be placed around the parts being operated upon.

The style of burners used has been found to produce the greatest amount of heat with the least consumption of gas. The flame can be thrown in any direction desired, and both air and gas are controlled by valves, at the will of the operator.

The air reservoir is very large, and the pressure is controlled by a safety valve, with detachable weights, and can be varied to suit the work.

Weight, as shown, 280 pounds. Size of gas pipe connection, 1 inch.
Size of air pipe connection, $1\frac{1}{2}$ inch.

FIG. 1538.

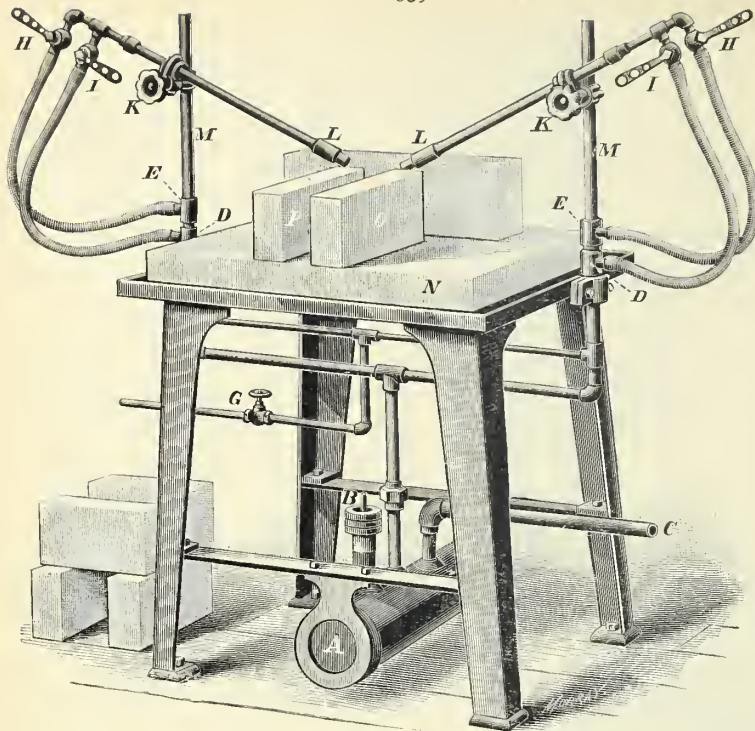


IMPROVED GASOLINE BRAZER.

This improved brazer is a portable machine, 48 inches high, weighs 20 pounds, and can be put anywhere in the shop. It has a low temperature generator, which makes it much less liable to carbon deposit in the pipes, and is so constructed that the coils can be easily cleaned when necessary. It has an improved natural blast, keeping out cold air and preventing scale on the work; the fire is perfectly clean and steady and is under the entire control of the operator, being easily adjusted for light or heavy work.

This brazer is also a most desirable forge tempering or hardening tool, or for any mechanical work requiring high grade and perfectly clean fire.

FIG. 1539.



Brazing Table No. 1.

BICYCLE BRAZING TABLE.

This is a convenient forge for brazing joints in various positions. The blow pipes, *L L*, are pivoted and hinged so as to be easily adjusted to any desired angle or height by the set-screw, *K*, which controls both pivot and hinge, so that when released the blow pipes can be placed in any position and secured by tightening the set screw, *K*. *N*, is a fire-clay slab 14 inches square, and the fire-brick, *O P Q*, can be moved and placed so as to enclose the joint to be brazed and thus concentrate the heat upon the desired spot. A few extra bricks afford the opportunity to enclose any desired space. Gas connects at *G*, and air at *C*. The air pressure is controlled by the escape-valve, *B*, which has detachable weights, and can be varied from $\frac{1}{2}$ to $\frac{3}{4}$ and 1 pound to the square inch, according to heat desired. It was built for bicycle work, but has since found favor with manufacturers for many other purposes.

MELTING FURNACE No. 2.

This furnace is used principally for melting gold and silver by jewelry manufacturers, for assay work, and small melts of copper, brass, etc. It can be used only in connection with pressure blowers.

The furnace proper consists of three principal parts, the bottom, *F*, the burner ring with burner tips, *E*, projecting into it, and the cylinder, *K*, which rests upon the bottom, *F*, by its own weight. The bottom contains the rest or support upon which the crucible stands, and is slotted underneath so as to cover, but not obstruct, a passage-way in the bottom to the crucible which is screwed against it from below, to receive leakage or overflow.

The burner ring is clamped to the table and incloses the bottom, the tips projecting into it through the slots, *E*, which are tightly fitted with fire-clay putty so as to make a tight joint between the tips and the bottom. The three tips are so directed that the flames do not strike the crucible but rotate around it in the space between the cylinder and crucible, and a most perfect combustion is secured before its products escape through the vent hole in the cover, *L*.

All parts are detachable and easily replaced. The bottom drops down by unscrewing the wing nuts, *I*, which pass through the platform, *H*. The burner ring is held in position by three clamps secured to the table by bolts, shown on top, and the drip cup or crucible is held by the set screw which passes through the arm. Blast pipe connects at *A*, gas, $\frac{3}{8}$ inch pipe, at *G*. *B* is the pressure relief valve.

Floor space, 29 x 24 inches. Height to table, 29 inches. Gas consumed, 50 to 75 cubic feet per hour. Time of melting 5 pounds copper, 10 minutes.

CAPACITY:

Black lead crucible, No. 5, $5\frac{3}{4}$ inches high.

Round sand crucible, "Sixes," 6 inches high.

FIG. 1540.

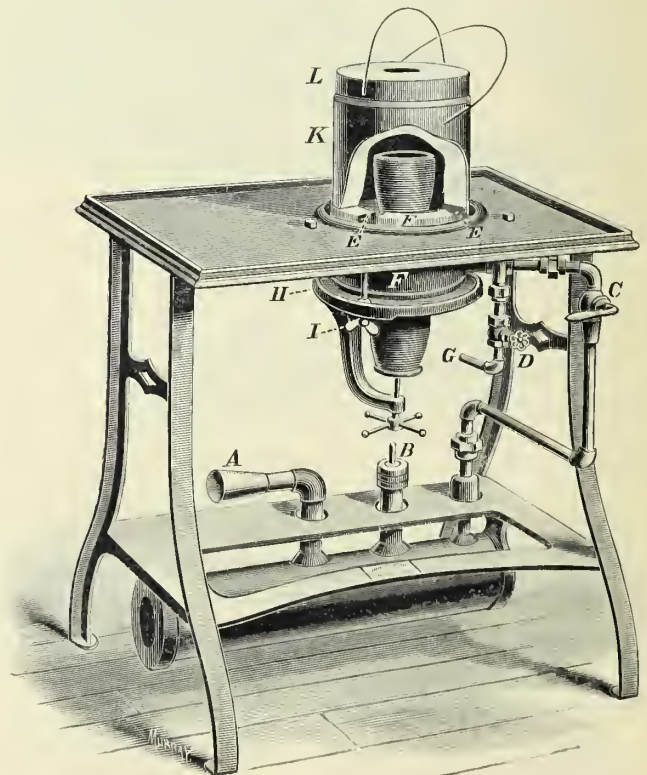
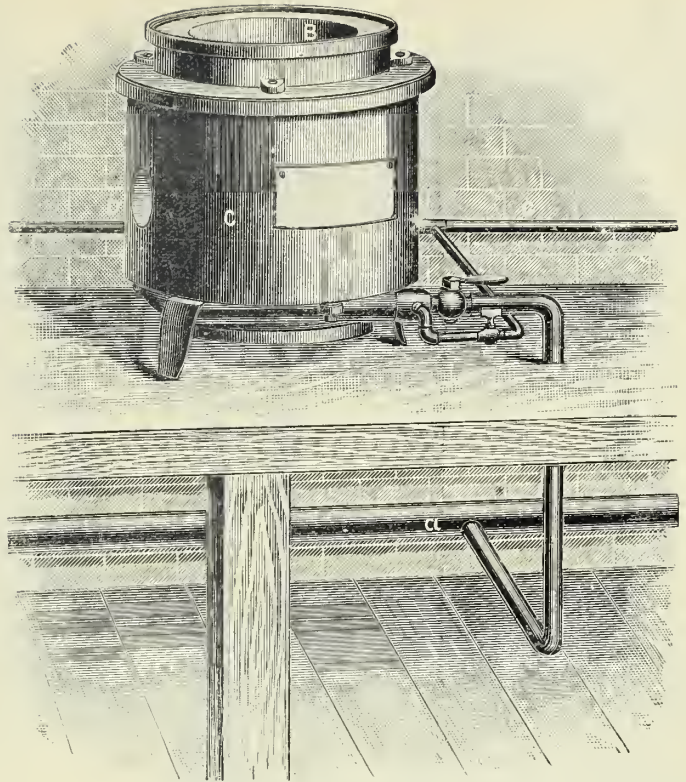


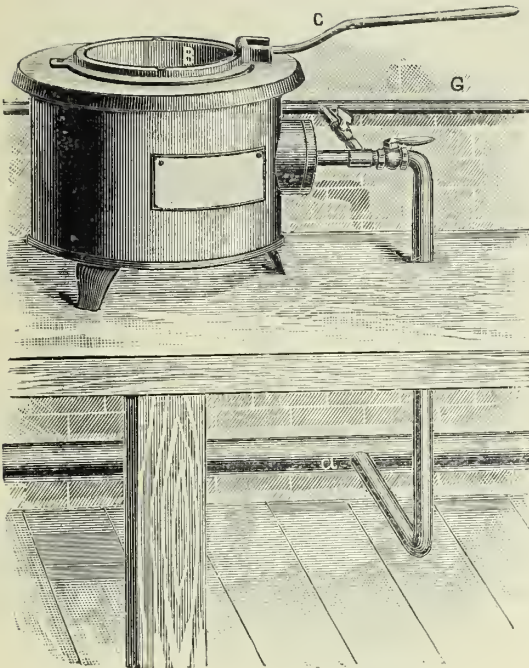
FIG. 1542.



BABBITT METAL MELTER No. 2.

Capacity : 25 pounds.

FIG. 1541.



BABBITT METAL FURNACE No. 1.

Capacity : 6 pounds.

THESE Babbitt Metal Melters are intended for melting and keeping at the proper temperature smaller quantities of Babbitt metal, and are usually placed on a work bench, as shown. We can supply them mounted on cast iron stand, same as soft metal furnaces, at an extra charge of ten dollars, including an air drum attached to stand.

No. 1 holds a pot which is removable by detachable handle, C, and is a ladle and melting pot in one.

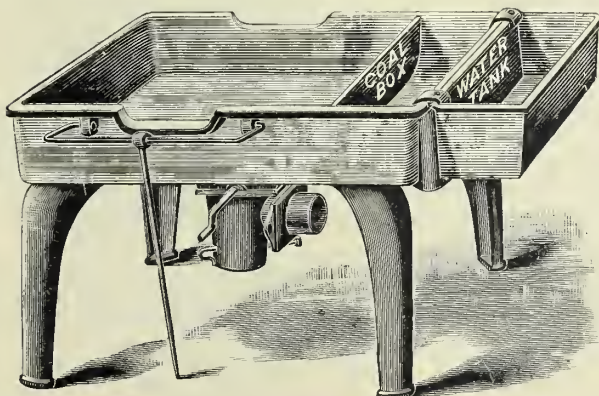
No. 2 holds a pot which is too heavy for convenient handling, and the metal is dipped out by the ordinary ladle.

To supply the required positive air pressure for a single furnace of either size, a No. 1 "Crowell Blower" (\$15.00) is used, and from Nos. 2 to 4 furnaces a No. 2 "Crowell Blower" (\$20.00).

Gas supply by $\frac{3}{8}$ pipe, reduced to $\frac{1}{4}$ near furnace.

Any desired size to order. For large quantities the soft metal furnaces Nos. 2 and 3, are used and still larger furnaces made on the same plan.

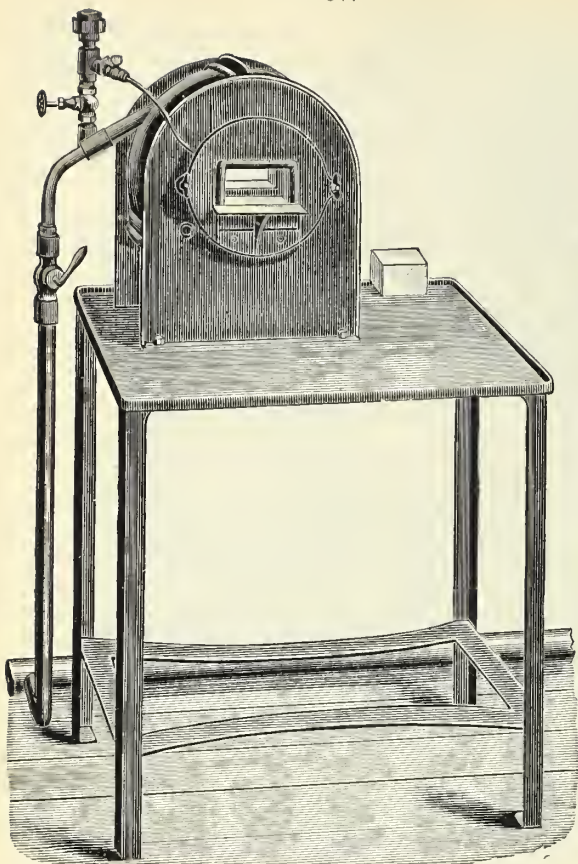
FIG. 1543.



STATIONARY BLAST FORGE No. 12.

Height 26 inches, size of hearth 39 x 52 over all, in-	
cluding water tank 39 x 63, - - - - -	\$35 00
Canopy hood, extra, - - - - -	3 75
Height 26 inches, size of hearth 48 x 61 inches ; over	
all 48 x 73 inches, - - - - -	70 00

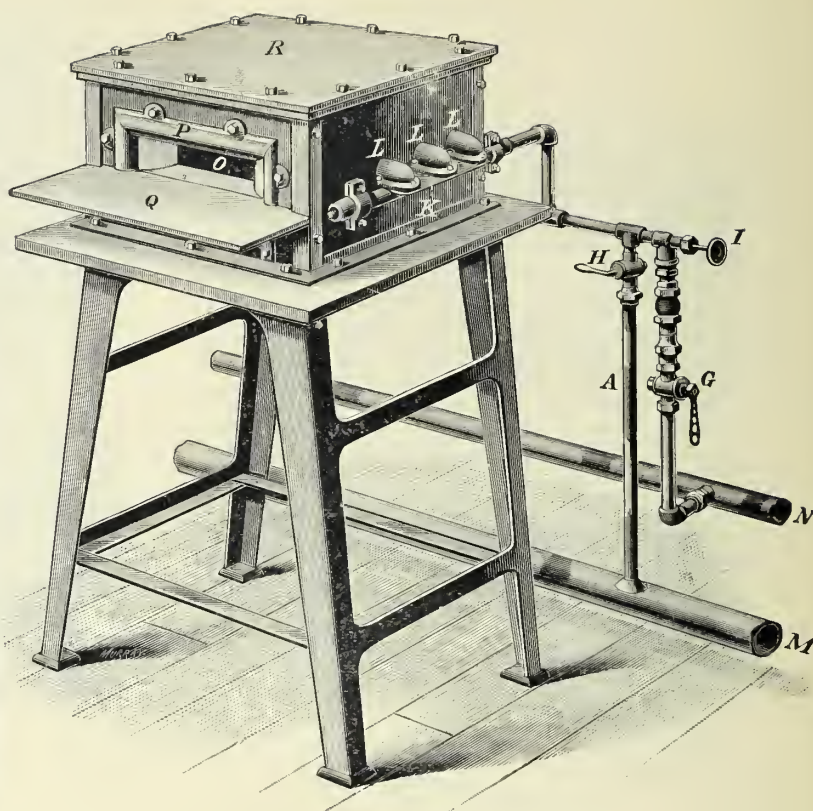
FIG. 1544.



GAS FORGE NO. 1.

Floor space: 24 x 20 inches.

FIG. 1545.



GAS FORGE NO. 3.

Floor space: 30 x 26 inches.

Heating space: 8 inches wide, 10 inches deep.

Entrance: 8 x 3 inches.

GAS FORGES.

GAS FORGE No. 1 is the type commonly used for dressing and hardening tools and smaller forgings. The burner is such as is used in melting furnaces, in vertical position. The heating chamber is circular inside, and its capacity is limited to the size of the entrance to the heating chamber, which is 3 inches wide by 2 inches high. A corresponding opening in the back, $3\frac{1}{2} \times 2\frac{1}{2}$ inches, is ordinarily closed by a plug, but can be removed when a clear passage through the furnace is required, or to insert something which is too large for the front opening. Three burners project into the heating chamber from the distributing ring, so directed that direct contact of the flames with the work is avoided. Thus perfect combustion is steadily maintained, the work is quickly and evenly heated, and oxidation reduced to a minimum.

The furnace is connected with air by tin pipe, which must run downward and connect with a supply pipe brought to the furnace along the floor or not to exceed one foot above it.

The cock controls the air supply. Gas connects with a union from the nearest supply pipe by $\frac{3}{4}$ inch pipe. A globe valve controls the gas supply and a small cock feeds a "torchlight" in the mouth of the furnace.

Gas Forge No. 2 is identical in construction with No. 1 but of larger capacity. The heating chamber is 8 inches deep with entrance 6 x 3 inches. The burner, L, is a solid east iron ring with detachable burner tips, M. A, cast iron shelf, P affords a support for the work. The gas supply is connected at H and blast at R.

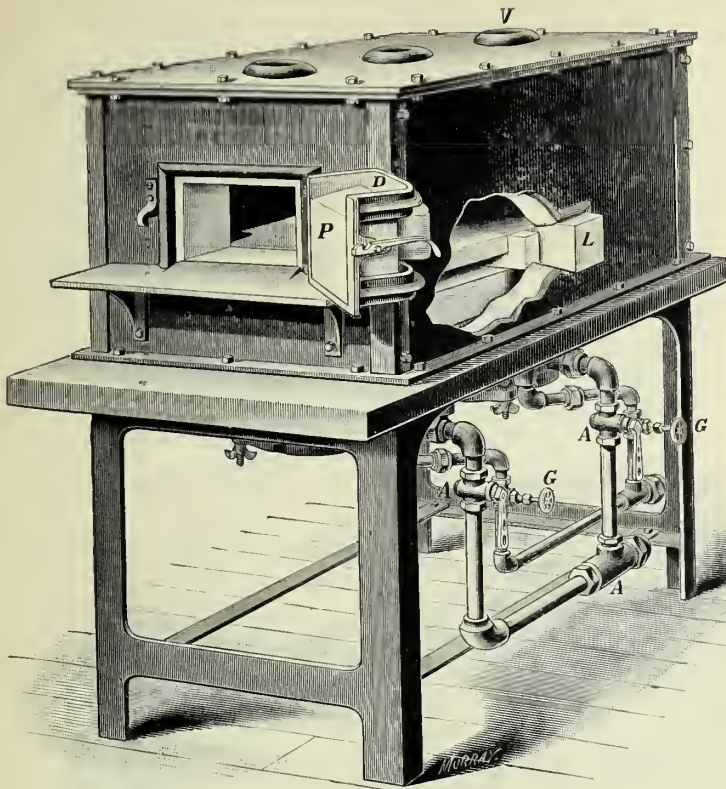
These forges are made for oil, water, natural and any kind of illuminating gas as ordered.

Gas Forge No. 3. This style of forge is especially recommended for drop forgings, to heat blanks continuously and keep them at the proper heat. The heating space is 10 inches deep, 8 inches wide and 3 inches high. The burners, L, penetrate the chamber from opposite sides and are so directed that they do not strike the work direct. The blanks rest upon a fire brick bottom, which is removable from the rear for cleaning out the chamber. This forge is extensively used in connection with oil gas, but can be adapted to every other kind, and dimensions varied as desired.

Gas Forge No. 4. This is one of the many types of forges made for special work, and can be varied in dimensions and arrangement to suit special purposes. It was made to heat small pieces of steel rapidly, to forge and harden them. The pieces are placed in the slot, K L. The heat is generated in the combustion chamber below from a burner inserted in the rear, and is sufficiently confined to come up evenly through the narrow slot in the lining. To relieve the operator from needless exposure to the heat it is drawn off through the flue, M, instead of being driven against him.

Made of any desired dimensions to order only.

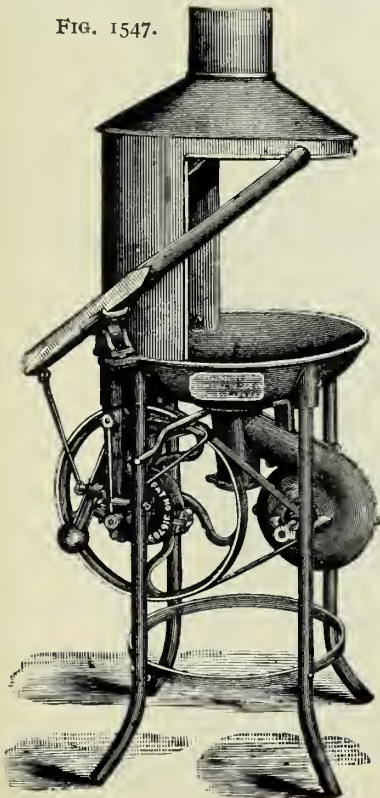
FIG. 1546.

**CASE HARDENING FURNACE No. 2.**

(No. 1 is the same but shorter.)

High Pressure Blowers are indispensable. For Furnaces No. 1, 2, 3, our No. 1 Blower is sufficient and will run two furnaces, No. 1 or No. 2. The No. 4 requires a No. 2 Blower.

FIG. 1547.

**TOOLMAKERS' LEVER FORGE.**

No. 6. Toolmakers' Forge, half hood, fan,
10 inches ; height, 33 inches ; hearth, 22
inches diameter ; weight, 85 $\frac{1}{2}$ pounds.
Price, - - - - - \$27.00

MACHINISTS' HAND AND POWER FORGE COMBINED.

Forge No. 10. Pan, 12 inches ; hearth, 23 by
35 inches ; height, 30 inches ; weight,
160 pounds. Price, complete, \$48.00

CASE HARDENING FURNACES.

These Furnaces are precisely similar to the Oven Furnaces in construction, and are intended for work requiring higher heat continuously applied for several hours, such as "Case Hardening" and the annealing of steel dies, hubs, tool steel, etc. The linings are much thicker than those of oven furnaces, as is also the slab, which separates the combustion chamber below, from the heating chamber above it. In place of the usual iron door, as applied to Oven Furnaces, the entrance is closed by the fire clay Plug P, which is carried by the door frame D, by means of which it is inserted or drawn out with ease. The Plug, when in position, is flush with the inside walls of the heating chamber, which is thus enclosed by an even thickness of fire brick on all sides.

The Furnaces are used for annealing blanks and dies in the U. S. Mint, and for case hardening bicycle chain links, etc.

Nos.	-	-	1	2
Estimated gas consumed, per hour,	-	-	100	150 cubic feet

	Floor Space Required.	DIMENSIONS. Clear Inside Space Available. Wide-Deep.	Entrance. Wide-High.
No. 1,	29 x 40	10 $\frac{1}{2}$ x 19 $\frac{1}{2}$	8 $\frac{1}{2}$ x 6 $\frac{3}{4}$
No. 2,	29 x 74	10 $\frac{1}{2}$ x 38	8 $\frac{1}{2}$ x 6 $\frac{3}{4}$

CASE HARDENING FURNACE No. 3.

Also for Annealing Steel, Heating Large Dies, Etc.

Floor space,	-	-	47 x 39
Heating space ; two compartments each,	-	-	13 x 16
Entrance,	-	-	11 $\frac{1}{4}$ x 10 $\frac{1}{2}$

CASE HARDENING FURNACE No. 4.

Also used for Annealing Steel, Heating Dies, Etc.

Floor space,	-	-	66 x 40
Heating space,	-	-	45 x 21
Entrance,	-	-	18 x 8

Nos.	-	-	3	4
Estimated gas consumed, per hour,	-	-	200	350 cubic feet

In placing an order the outside dimensions should be given of the box or boxes to be inserted, or the cubic space required for the largest body to be heated, when we will make the correct allowances for clearances, etc.

In placing an order the outside dimensions should be given of the box or boxes to be inserted, or the cubic space required for the largest body to be heated, when we will make the correct allowances for clearances, etc.

FIG. 1548.

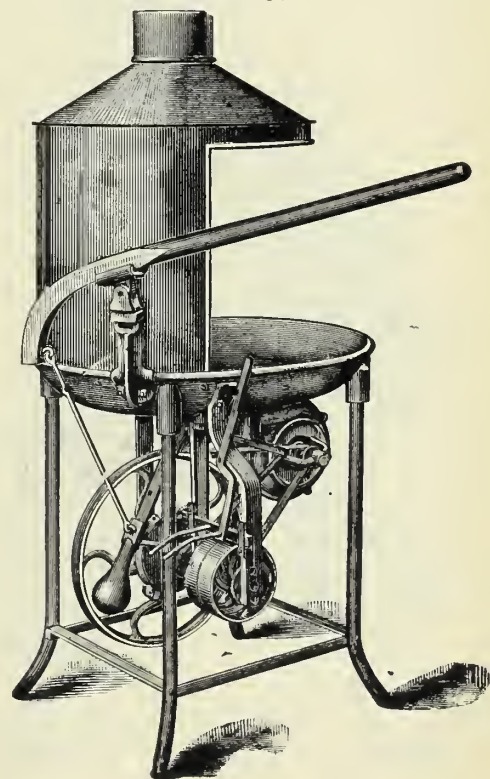
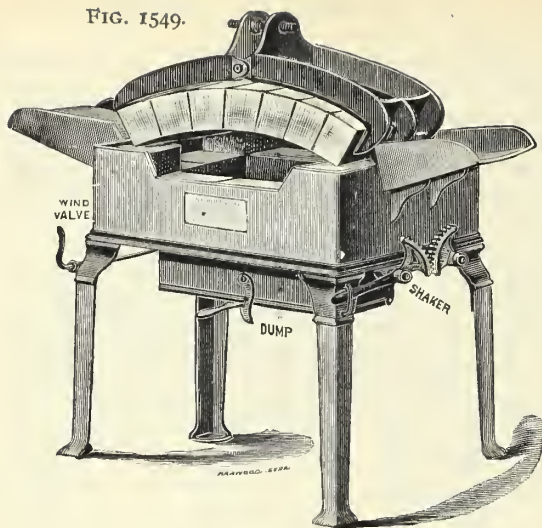


FIG. 1549.

**HEATING FORGES.**

FOR HARD COAL, OR COKE.

No. 8 has 2 grates, each $4\frac{1}{2} \times 18$ inches, giving a total grate surface of 9×18 inches. Brick required: For box, 26 common, $2\frac{1}{2} \times 4\frac{1}{2} \times 9$; for top, 7 arch, $3\frac{3}{8}$ and $3\frac{7}{8} \times 4\frac{1}{2} \times 12$ inches.

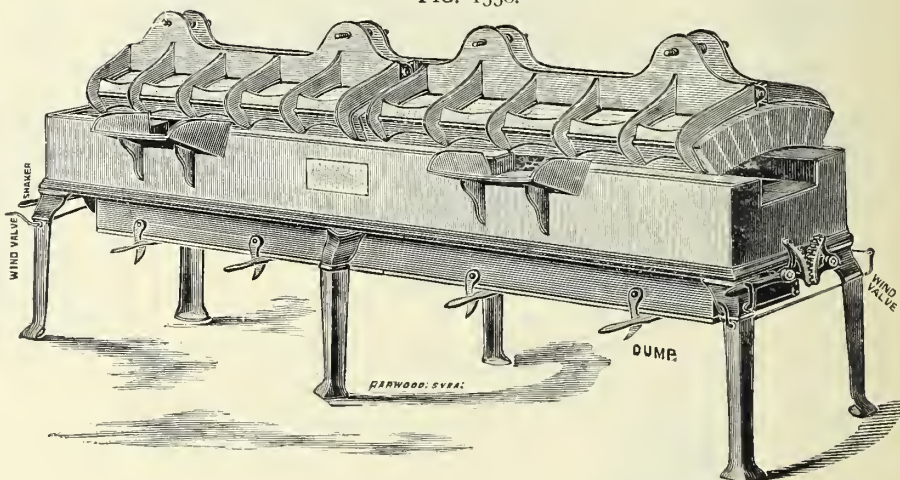
No.		Grate Surface.	Price.
6,	without bricks,	9×9	\$30 00
7,	"	9×14	40 00
8,	"	9×18	50 00
9,	"	14×23	55 00
10,	"	9×41	70 00
11,	"	23×28	90 00
12,	"	14×74	125 00

Grate surfaces given are inside measurements after brick are in place.

In ordering always state plainly style and size, and which way you wish to use the forge.

Brick: Common, 5 cts. each; arch, 10 cts. each, net.

FIG. 1550.



No. 12 has 4 grates, each 7×37 inches, giving a total grate surface of 14×74 inches. Open ends.

Brick required: For box, 120 common, $2\frac{1}{2} \times 4\frac{1}{2} \times 9$ inches; for top, 40 common, $2\frac{1}{2} \times 4\frac{1}{2} \times 9$ inches, and 40 arch, 2 and $2\frac{1}{2} \times 4\frac{1}{2} \times 9$ inches.

In filling top, put a common brick in first, then a taper one, and thus alternate until complete.

FIG. 1551.

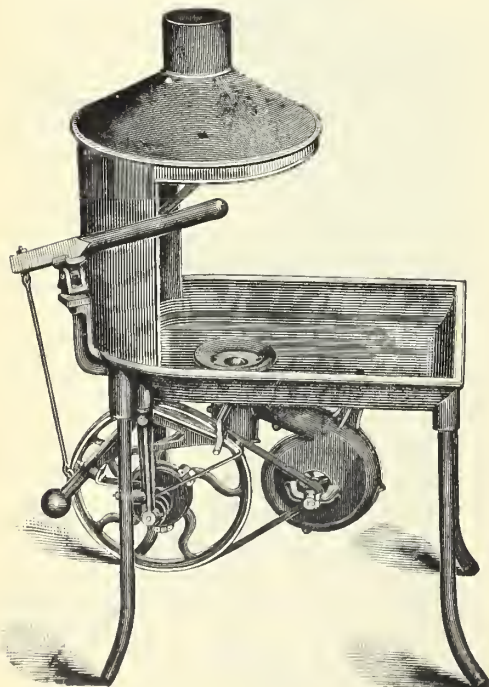
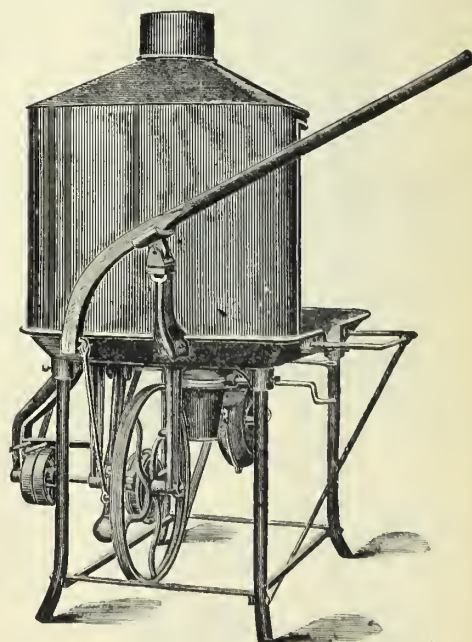


FIG. 1552.

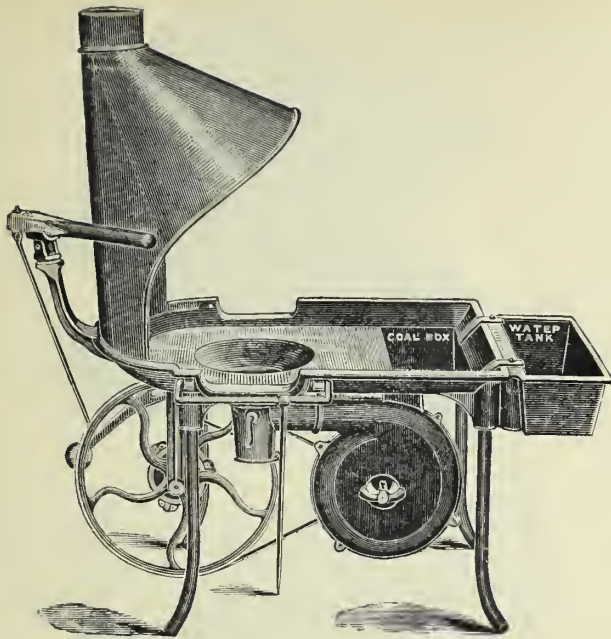
**MACHINISTS' PORTABLE LEVER FORGE.**

No. 3, Machinists' Forge, half hood, fan 12 inches, hearth 23×35 inches, height 30 inches, weight 130 pounds. Price, - - - - \$40 00

BLACKSMITHS' HAND AND POWER FORGE.

Forge No. 13, fan 16 inches, hearth 32×45 inches, height 30 inches. Price, with slope bottom coal box, without water tank, - \$58 00
Price, with water tank complete, 63 00

FIG. 1553.



No. 1½. Made only in Half Hood.

LEVER BLACKSMITH FORGE.

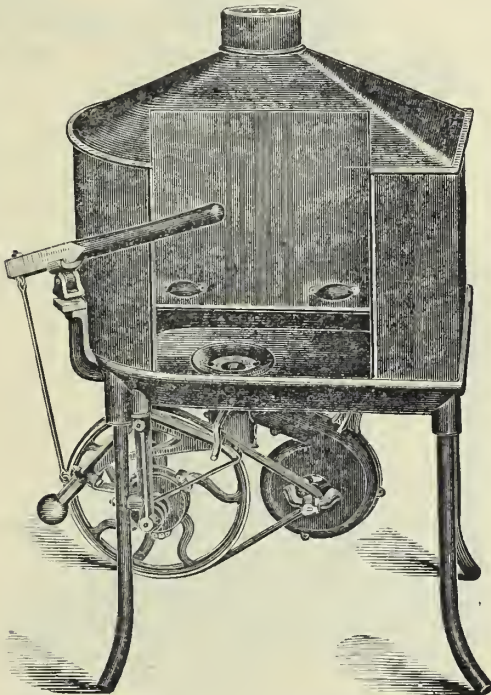
The size of fan is 16 inches, fly wheel 25 inches in diameter. Warranted to give sufficient blast for all kinds of blacksmith work.

No. 1½ Lever Blacksmith Forge, fan, 16 inches; hearth, 28 x 41 inches; height, 30 inches; weight, 250 lbs.

Price, without water tank, - - - - - \$50 00

Price, with water tank, - - - - - 54 00

FIG. 1555.

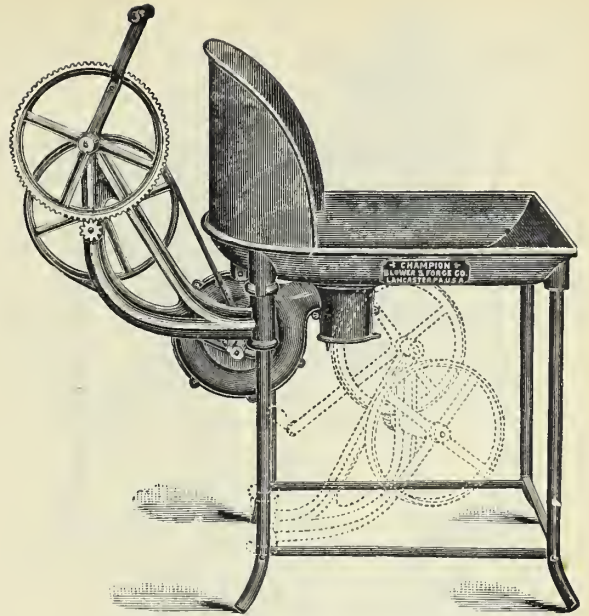


MACHINISTS' LEVER FORGE.

No. 4, Lever Forge, closed hood; fan, 12 inches; hearth, 23 x 35 inches; height, 30 inches; weight, 140 pounds.

Price, - - - - - \$42 00

FIG. 1554.



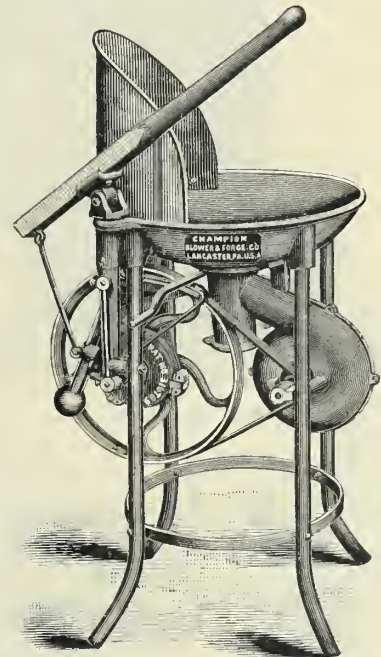
Forge No. 15. With Shield.

BOILERMAKERS' CRANK FORGE.

No. 15, Boilermakers' Crank Forge, with shield. Fan, 10 inches; hearth, 22 x 28 inches; height, 30 inches; weight, 120 pounds.

Price, - - - - - \$29 00

FIG. 1556.



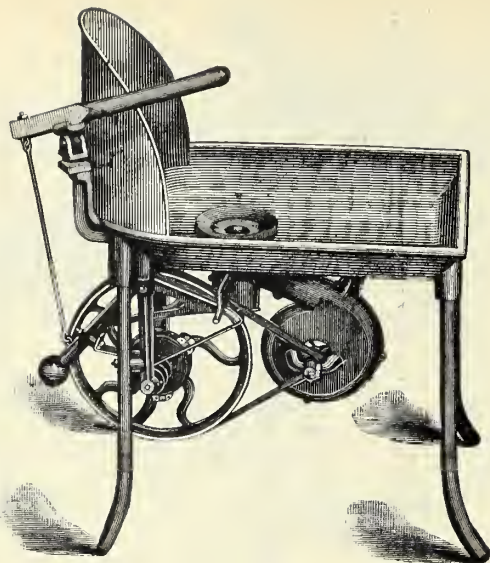
Forge No. 5. With Shield.

PORTABLE LEVER RIVET FORGE.

No. 5, Rivet Forge, with shield. Fan, 10 inches; height, 33 inches; hearth, 22 inches diameter; weight, 80 pounds.

Price, - - - - - \$24 00

FIG. 1557.



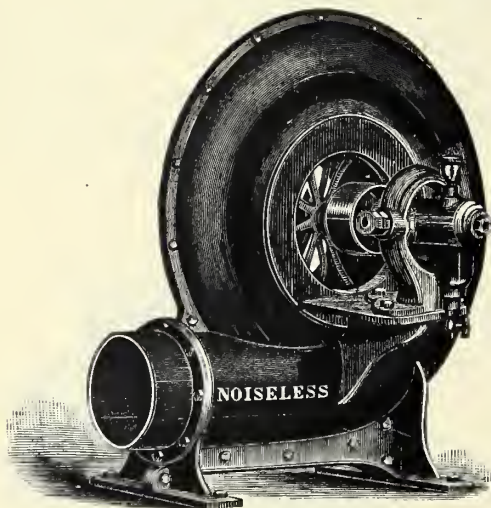
Forge, No. 2. With Shield.

BOILERMAKERS' LEVER FORGE.

No. 2, Boilermakers' Forge, with shield. Fan, 12 inches; hearth, 23 x 35 inches; height, 30 inches; weight, 120 pounds.

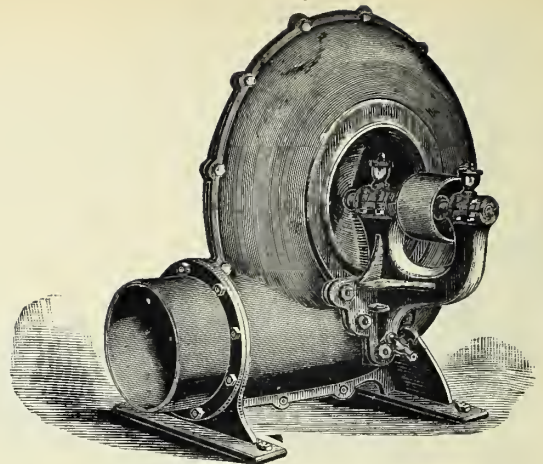
Price, - - - - - \$36 00

FIG. 1559.

**FAN BLOWER.**

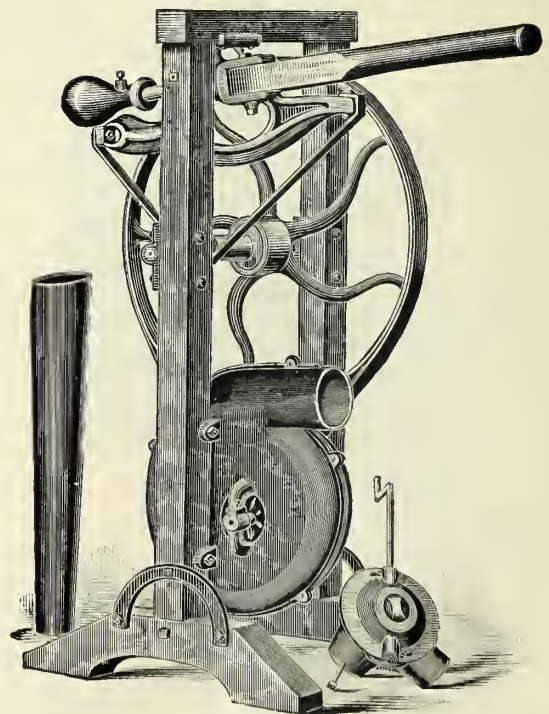
No. of Exhauster.	Price.	Height in Inches.	Diameter of Inlet.	Diameter of Outlet.	Diameter of Pulley.	Face of Pulley.	Revolutions Per Min. 2 Oz. Blast for Boiler Fires.	Revolutions Per Min. 4 Oz. Blast for Forge Fires.
1	\$15 00	15	5	4	2 ⁹ / ₁₆	2	3000	4000
2	20 00	18	5 ³ / ₄	4 ³ / ₄	3	2 ¹ / ₂	2600	3600
3	26 00	21 ¹ / ₂	6 ¹ / ₂	5 ³ / ₄	3 ¹ / ₂	2 ¹ / ₂	2300	3200
4	33 00	25 ¹ / ₂	7 ¹ / ₂	7 ¹ / ₂	4 ¹ / ₄	3 ¹ / ₂	1928	2682
5	44 00	29 ¹ / ₄	9	9	5 ¹ / ₂	4	1638	2279
6	55 00	34	10 ¹ / ₂	10 ¹ / ₂	6	4 ³ / ₄	1410	1961
7	70 00	40	12	12	6 ³ / ₄	5 ¹ / ₄	1194	1662
8	90 00	45	14	14	8	6 ¹ / ₂	1018	1417
9	150 00	50	16	16	9	8	878	1234
10	200 00	57	18	18	10	9	766	1065
11	250 00	65	21	21	12	10 ¹ / ₂	671	932

FIG. 1558.

**EXHAUST FAN.**

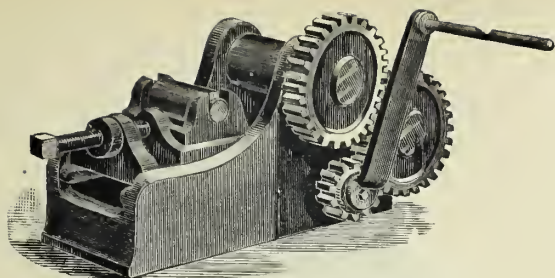
No. of Exhauster.	Price.	Height in Inches.	Diameter of Inlet.	Diameter of Outlet.	Diameter of Pulley.	Face of Pulley.	Revolutions Per Min. 2 Oz. Blast for Boiler Fires.	Revolutions Per Min. 4 Oz. Blast for Forge Fires.
1	\$15 00	15	5	4	2 ⁹ / ₁₆	2	3000	4000
2	20 00	18	5 ³ / ₄	4 ³ / ₄	3	2 ¹ / ₂	2600	3600
3	26 00	21 ¹ / ₂	6 ¹ / ₂	5 ³ / ₄	3 ¹ / ₂	2 ¹ / ₂	2300	3200
4	33 00	25 ¹ / ₂	7 ¹ / ₂	7 ¹ / ₂	4 ¹ / ₄	3 ¹ / ₂	1928	2682
5	44 00	29 ¹ / ₄	9	9	5 ¹ / ₂	4	1638	2279
6	55 00	34	10 ¹ / ₂	10 ¹ / ₂	6	4 ³ / ₄	1410	1961
7	70 00	40	12	12	6 ³ / ₄	5 ¹ / ₄	1194	1662
8	90 00	45	14	14	8	6 ¹ / ₂	1018	1417
9	150 00	50	16	16	9	8	878	1234
10	200 00	57	18	18	10	9	766	1065
11	250 00	65	21	21	12	10 ¹ / ₂	671	932

FIG. 1560.

**LEVER BLACKSMITH BLOWER.**

Price, complete, with Tuyere iron and piping, f. o. b. factory, \$10 00
Every Blower Warranted.

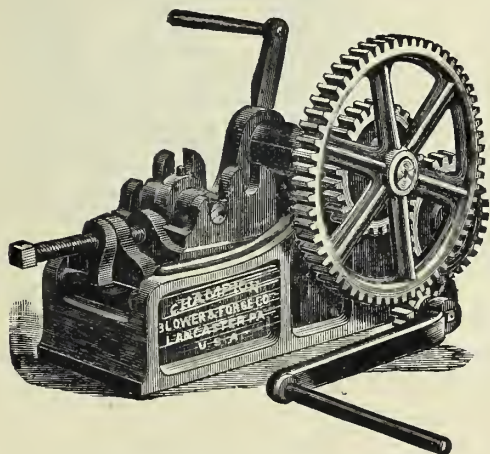
FIG. 1561.



THE CHAMPION TIRE BENDER.

Price, - - - - - \$9.00

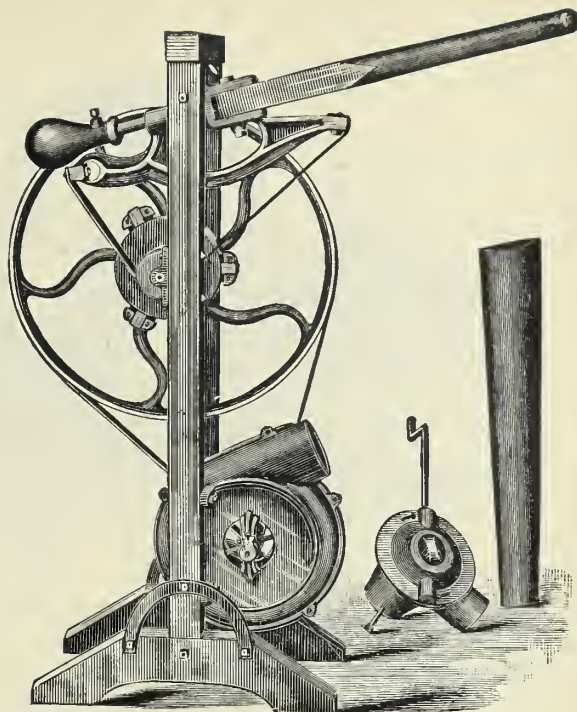
FIG. 1563.



THE EUREKA TIRE BENDER.

No. 1, - - - \$16.00 No. 2, - - - \$25.00

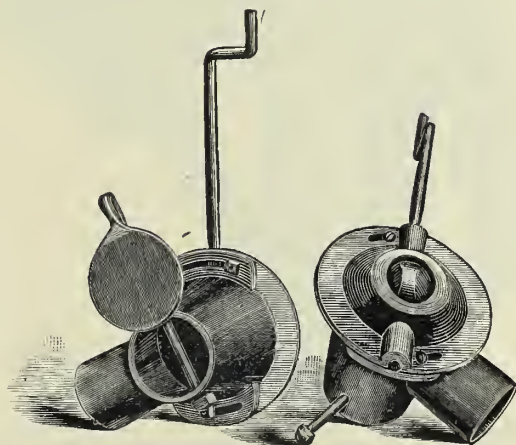
FIG. 1562.



LEVER BLOWER No. 4 1/2.

No. 4 1/2 Lever Blower, iron frame, fan 16 inches, complete,
with Tuyere iron and piping, - - - \$22 00

FIG. 1564.



THE PATENT ADJUSTABLE NOZZLE TUYERE IRON.

Price, - - - - - \$2.50

FIG. 1565.

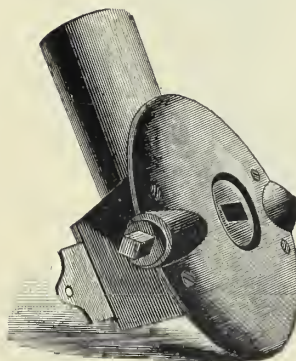
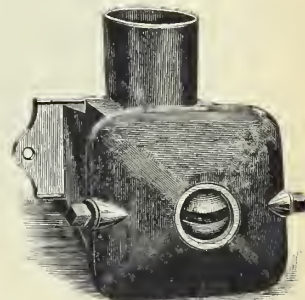


FIG. 1566.



PEERLESS TIRE BENDERS.

FIG. 1567.

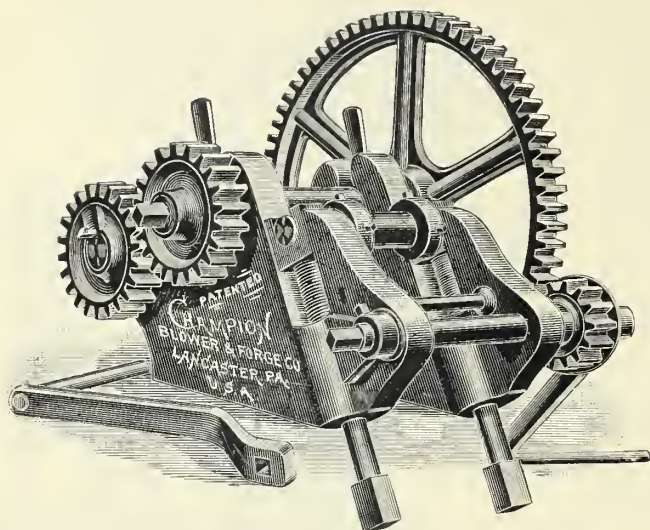


FIG. 1568.

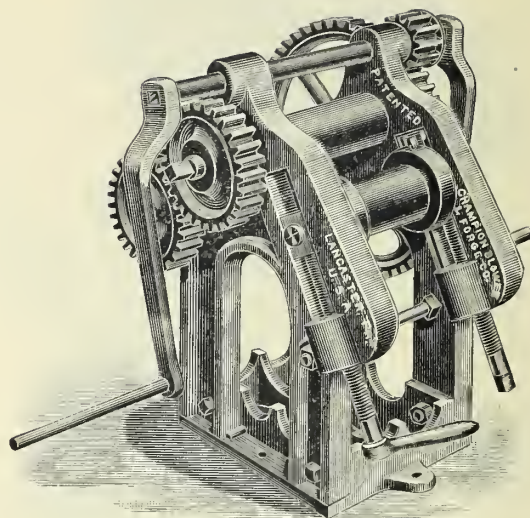
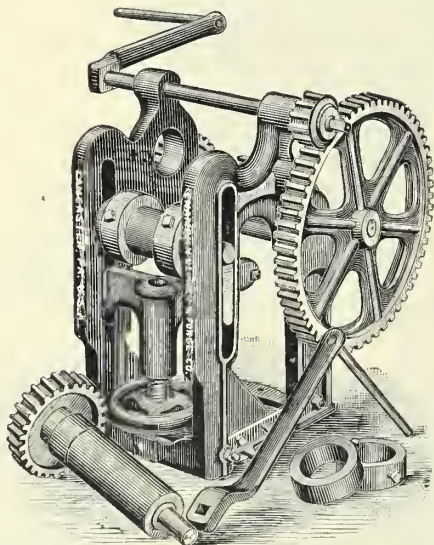
[illegible]

FIG. 1569.



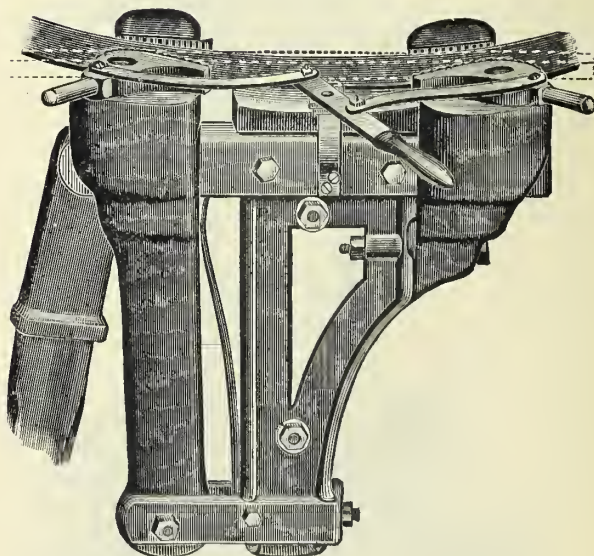
THE PATENT GIANT TIRE BENDER.

MADE IN 5 SIZES.

Weight 375 pounds, extra heavy, bends 6 x 1,	-	-	\$45.00
Weight 330 pounds, No. 1, bends 5 x 1,	-	-	40.00
Weight 236 pounds, No. 2, bends 3 x 1,	-	-	30.00
Weight 175 pounds, No. 3, bends 3 x $\frac{3}{4}$,	-	-	24.00

All benders can be made to run by power, when specially ordered, for which an extra charge will be made.

FIG. 1570.



THE LANCASTER TIRE AND AXLE SHRINKER.

Weight 150 pounds. Price, - - - - \$17.00

EMERY AND CORUNDUM WHEELS.

STANDARD PRICE LIST.

Diameter in Inches.	THICKNESS IN INCHES.															Revolutions per Minute.
	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	
1 1/2	\$ 40	\$ 45	\$ 50	\$ 55	\$ 60	\$ 65	\$ 70	\$ 75	\$ 80	\$ 85	\$ 90	\$ 95	\$ 1 00	\$ 1 05	\$ 1 10	14,000
2	50	55	60	65	70	75	80	85	90	95	1 00	1 05	1 10	1 15	1 20	10,000
2 1/2	65	75	85	95	1 05	1 15	1 25	1 35	1 45	1 55	1 65	1 75	1 85	1 95	2 05	8,500
3	80	95	1 10	1 25	1 40	1 55	1 70	1 85	2 00	2 15	2 30	2 45	2 60	2 75	2 90	7,000
3 1/2	95	1 15	1 35	1 55	1 75	1 95	2 15	2 35	2 55	2 75	2 95	3 15	3 35	3 55	3 75	6,035
4	1 10	1 35	1 60	1 85	2 10	2 35	2 60	2 85	3 10	3 35	3 60	3 85	4 10	4 35	4 60	5,300
4 1/2	1 25	1 55	1 85	2 15	2 45	2 75	3 05	3 35	3 65	3 95	4 25	4 55	4 85	5 15	5 45	4,700
5	1 40	1 80	2 20	2 60	3 00	3 40	3 80	4 20	4 60	5 00	5 40	5 80	6 20	6 60	7 00	4,200
6	1 75	2 40	3 05	3 70	4 35	5 00	5 65	6 30	6 95	7 60	8 25	8 90	9 55	10 20	10 85	3,500
7	2 15	3 00	3 85	4 70	5 55	6 40	7 25	8 10	8 95	9 80	10 65	11 50	12 35	13 20	14 05	3,000
8	2 60	3 60	4 60	5 60	6 60	7 60	8 60	9 60	10 60	11 60	12 60	13 60	14 60	15 60	16 60	2,600
9	3 10	4 25	5 40	6 55	7 70	8 85	10 00	11 15	12 30	13 45	14 60	15 75	16 90	18 05	19 20	2,300
10	3 65	5 00	6 35	7 70	9 05	10 40	11 75	13 10	14 45	15 80	17 15	18 50	19 85	21 20	22 55	2,100
12	4 60	6 35	8 10	9 85	11 60	13 35	15 10	16 85	18 60	20 35	22 10	23 85	25 60	27 35	29 10	1,750
14	6 25	8 45	10 65	12 85	15 05	17 25	19 45	21 65	23 85	26 05	28 25	30 45	32 65	34 85	37 05	1,500
16	8 00	10 85	13 70	16 55	19 40	22 25	25 10	27 95	30 80	33 65	36 50	39 35	42 20	45 05	47 90	1,300
18	9 50	13 25	17 00	20 75	24 50	28 25	32 00	35 75	39 50	43 25	47 00	50 75	54 50	58 25	62 00	1,150
20	11 25	15 75	20 25	24 75	29 25	33 75	38 25	42 75	47 25	51 75	56 25	60 75	65 25	69 75	74 25	1,050
22	13 00	19 00	25 00	31 00	37 00	43 00	49 00	55 00	61 00	67 00	73 00	79 00	85 00	91 00	97 00	950
24	15 00	22 00	29 00	36 00	43 00	50 00	57 00	64 00	71 00	78 00	85 00	92 00	99 00	106 00	113 00	850
26	-	-	35 00	43 00	51 00	59 00	67 00	75 00	83 00	91 00	99 00	107 00	115 00	123 00	131 00	775
30	-	-	-	50 00	61 00	72 00	83 00	94 00	105 00	116 00	127 00	138 00	149 00	160 00	171 00	700
36	-	-	-	-	95 00	110 50	126 00	141 50	157 00	172 50	188 00	203 50	219 00	234 50	250 00	525
42	-	-	-	-	-	-	160 00	178 00	196 00	214 00	232 00	250 00	268 00	286 00	304 00	400
48	-	-	-	-	-	-	185 00	207 00	229 00	251 00	273 00	295 00	317 00	339 00	361 00	350

Wheels less than 1/2 inch thick same price as 1/2 inch.

FLINT PAPER.—Our Best.

In sheets 9 x 11 inches.

Nos. 000 to 1 1/2 and assorted,	-	-	\$4 50 per ream.
" 2 " 3,	-	-	5 00 "
" 3 1/2,	-	-	5 50 "

STAR FLINT PAPER.

In sheets 8 3/4 x 10 1/2 inches.

All numbers (0 to 3 and assorted),	-	-	\$3 75 per ream.
------------------------------------	---	---	------------------

EXTRA FLINT PAPER.—In Rolls.

Per roll 50 yards long.

Width.	Nos. 00 to 1 1/2	No. 2	No. 2 1/2	No. 3	No. 3 1/2	No. 4
24 inches,	\$5 00	\$5 50	\$6 00	\$6 50	\$7 50	\$8 50
30 inches,	8 00	9 00	10 00	11 00	13 00	15 00
36 inches,	10 00	11 00	12 00	13 00	15 00	17 00
40 inches,	12 00	13 00	14 00	15 00	17 00	20 00
42 inches,	13 00	14 00	15 00	16 00	18 00	21 00
48 inches,	15 00	17 00	18 00	20 00	23 00	26 00

EMERY PAPER.—Per Ream.

In sheets 9 x 11 inches.

Nos. 00 to 1 1/2	No. 2	No. 2 1/2	No. 3	No. 3 1/2
\$6 50	\$7 50	\$9 50	\$11 50	\$13 50

EMERY PAPER.—Per Roll.

24 inches wide and 50 yards long.

Nos. 00 to 1 1/2	No. 2	No. 2 1/2	No. 3	No. 3 1/2
\$6 50	\$7 50	\$9 50	\$11 50	\$13 50

EMERY CLOTH.—Per Ream.

In sheets 9 x 11 inches.

Nos. FF to 1 1/2	No. 2	No. 2 1/2	No. 3	No. 3 1/2	Crocus Cloth.
\$18 00	\$20 00	\$24 00	\$26 00	\$28 00	\$18 00

SAND CLOTH.—Per Roll.

14 inches wide and 50 yards long.

Nos. 00 to 2	Nos. 2 1/2 and 3
\$10 00	\$12 50

EMERY CLOTH.—Per Roll.

50 yards long.

Width.	Nos. 00 to 1 1/2	No. 2	No. 2 1/2	No. 3	No. 3 1/2
9 inches,	\$7 50	\$9 00	\$10 50	\$12 50	\$14 50
18 inches,	15 00	18 00	21 00	25 00	29 00
27 inches,	22 50	27 00	31 50	37 50	43 50

Summary of Quantities in Original Packages Well Pressed and Bound.

"FLINT" AND "STAR" PAPER.

Each bundle contains:

No.	00	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2
Reams,	5	5	4	3 1/2	3	2 1/2	2	1 1/2	1 1/2

GARNET AND EMERY PAPER.

No.	00	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2
Reams,	4 1/2	4	3 1/2	3	2 1/2	2	1 1/2	1 1/2	1 1/2

EMERY CLOTH.

Each bundle contains:

No.	00	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	Crocus.
Reams,	2 1/2	2 1/2	2	1 3/4	1 1/2	1 1/4	1	3/4	3/4	2

GARNET PAPER.

In sheets 9 x 11 inches.

Nos. 00 to 1 1/2,	-	-	-	-	-	\$5 50 per ream.
" 2,	-	-	-	-	-	6 00 "
" 2 1/2,	-	-	-	-	-	6 50 "
" 3,	-	-	-	-	-	7 00 "

Per Roll 50 Yards Long.

Width.	Nos. 00 to 1 1/2	No. 2	No. 2 1/2	No. 3	No. 3 1/2	No. 4
24 inches,	\$6 00	\$6 50	\$7 25	\$8 25	\$9 50	\$10 50
30 inches,	9 00	10 00	11 00	12 00	14 00	16 00
36 inches,	11 00	12 00	13 00	14 00	16 00	18 00
40 inches,	13 00	14 00	15 00	16 00	18 00	21 00
42 inches,	15 00	16 00	17 00	18 00	20 00	23 00
48 inches,	18 00	20 00	22 00	25 00	29 00	32 00

DUSTERS, BRUSHES AND CAR WASHERS.

FIG. 1571.

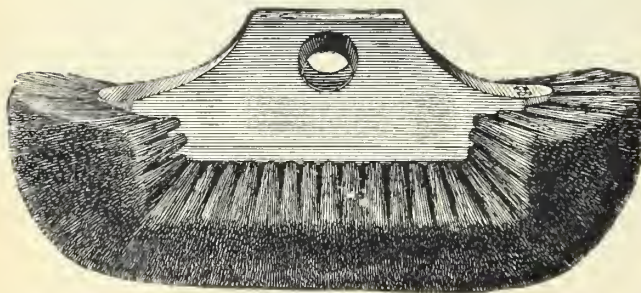


CARRIAGE DUSTERS.

For railway coaches, carriages, etc. Very heavy.

No. 1,	-	-	-	-	-	-	per dozen, \$25 20
" 2,	-	-	-	-	-	-	" 32 40
" 3,	-	-	-	-	-	-	" 36 00
" 4,	-	-	-	-	-	-	" 39 60
" 5,	-	-	-	-	-	-	" 43 20

FIG. 1573.

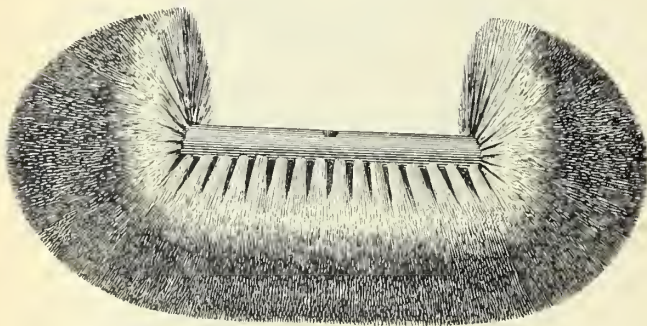


RAILWAY CAR WASHERS.

Many of the leading railroad companies, having used our Car Washers, pronounce them the best in the market.

No. 80.	All gray bristles,	-	-	-	per dozen, \$24 44
" 95.	Black horse hair, copper fastened,	-	-	-	" 27 76
	Extra gray bristles, cased with white,	-	-	-	" 28 88
" 90.	Black horse hair, copper fastened,	-	-	-	" 30 00
" 100.	" " " "	-	-	-	" 35 55

FIG. 1575.



CEILING BRUSHES.

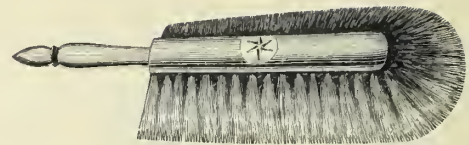
No. 1,	-	-	-	-	-	per dozen, \$26 88
" 2,	-	-	-	-	-	" 32 80

WATER CLOSET BRUSHES.

Long-handled brushes for washing closet hoppers.

No. 1,	-	-	-	-	-	per dozen, \$5 56
" 0.	Bent handles,	-	-	-	-	" 6 25
" 2,	-	-	-	-	-	" 11 40
" 3,	-	-	-	-	-	" 18 00

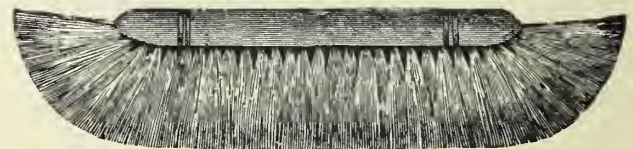
FIG. 1572.



FACTORY AND MILL DUSTERS.

No. 1,	-	-	-	-	-	-	per dozen, \$6 12
" 2,	-	-	-	-	-	-	" 7 88
" 3,	-	-	-	-	-	-	" 20 40
" 62,	-	-	-	-	-	-	" 21 66
" 69,	-	-	-	-	-	-	" 24 50
" 70,	-	-	-	-	-	-	" 24 00
" 79,	-	-	-	-	-	-	" 26 50
" 73,	-	-	-	-	-	-	" 28 00
" 87,	-	-	-	-	-	-	" 30 50

FIG. 1574.

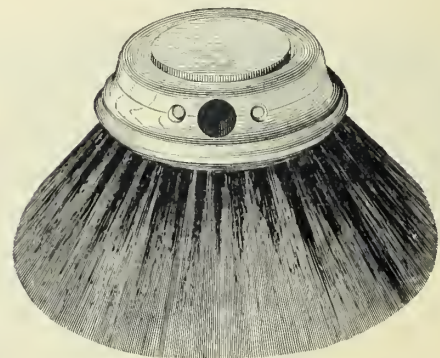


FLOOR BROOMS.—Wire Fastened.

Made on polished blocks of all black horse hair.

No.	Size Blocks.						
132.	12 inch.	-	-	-	-	-	per dozen, \$15 30
133.	13 "	-	-	-	-	-	" 18 25
134.	14 "	-	-	-	-	-	" 20 00
136.	16 "	-	-	-	-	-	" 24 00

FIG. 1576.



ROUND CAR WASHERS.

Made of the best quality of bristles, fastened with copper wire. The block is surrounded by an endless ring or band of vulcanized rubber which protects the sashes and other objects from injury.

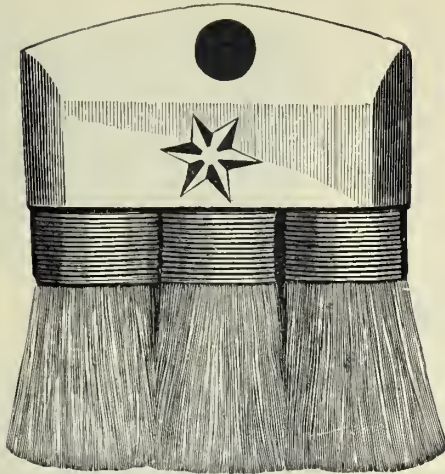
No. 14,	-	-	-	-	-	per dozen, \$26 66
" 15,	-	-	-	-	-	" 33 32
" 16,	-	-	-	-	-	" 36 66

SPIDER BRUSHES.

Same style as ceiling brushes, but smaller. All pure bristles. For washing windows, brushing cobwebs, etc.

No. 0.	All gray,	-	-	-	-	per dozen, \$10 00
" 1.	" " "	-	-	-	-	" 15 50
" 2.	White outside,	-	-	-	-	" 17 20

FIG. 1578.



ROOF BRUSHES.

QUALITY B.

Size, 2 knots,	-	-	-	-	-	per dozen,	\$14 60
" 3 "	-	-	-	-	-	"	19 50
" 4 "	-	-	-	-	-	"	26 50

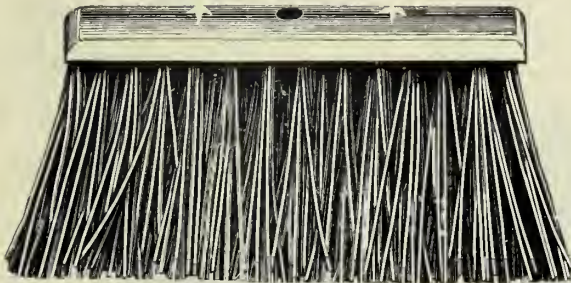
QUALITY C.

Size, 2 knots,	-	-	-	-	-	per dozen,	\$19 00
" 3 "	-	-	-	-	-	"	24 00
" 4 "	-	-	-	-	-	"	30 50

QUALITY EXTRA.

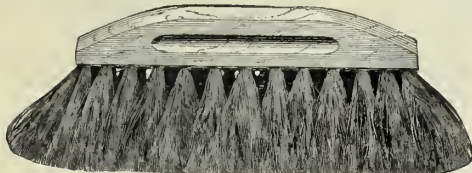
Size, 2 knots,	-	-	-	-	-	per dozen,	\$28 00
" 3 "	-	-	-	-	-	"	37 50
" 4 "	-	-	-	-	-	"	50 00

FIG. 1580.



A full line of Rattan Bass and Steel Brooms always in stock.
Prices on application.

FIG. 1582.

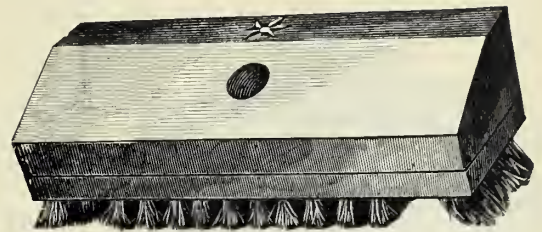


MOLDERS' DUSTERS.

Made of pure gray bristles for foundry use.

35,	8 inch block,	-	-	-	-	per dozen,	\$7 12
55,	9 "	-	-	-	-	"	8 00
45,	9 "	-	-	-	-	"	8 44
65,	9 "	-	-	-	-	"	9 60
5,	8½ "	-	-	-	-	"	10 00
75,	10½ "	-	-	-	-	"	12 80
1,	Molders' hard brush, wire drawn,	-	-	-	-	"	6 10
2,	" " " " " "	-	-	-	-	"	9 75

FIG. 1579.



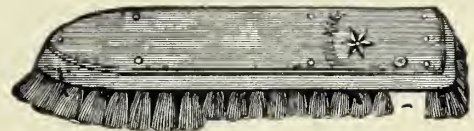
Solid Blocks.

CLAMP OR DECK SCRUB BRUSHES.

With four feet handles.

Size, 5 row,	-	-	-	-	-	per dozen,	\$2 25
" 6 "	-	-	-	-	-	"	2 50
" 7 "	-	-	-	-	-	"	2 88
" 8 "	-	-	-	-	-	"	3 00

FIG. 1581.

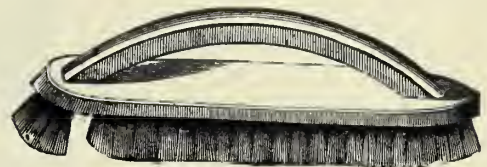


SCRUB BRUSHES.

Two-pieced, hand made.

No 209,	White tampico, double end,	-	per dozen,	\$0 90
" 211,	Gray and white tampico, double end,	-	"	95
" 213,	Gray tampico, double end,	-	"	1 00
" 215,	White tampico, double end,	-	"	1 05
" 217,	Gray and white tampico, double end,	-	"	1 10
" 219,	Gray tampico, double end,	-	"	1 15
" 221,	White tampico, double end,	-	"	1 15
" 223,	Gray and white tampico, double end,	-	"	1 25
" 225,	Gray tampico, double end,	-	"	1 38
" 1000,	White tampico, extra quality,	-	"	2 00
" 2000,	White tampico, extra quality,	-	"	2 12

FIG. 1583.

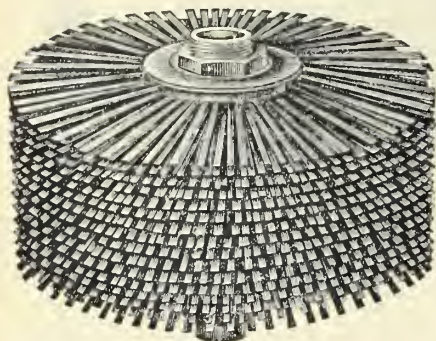


STOVE BRUSHES.

No. xx,	-	-	-	-	-	per dozen,	\$1 25
" 9,	-	-	-	-	-	"	1 25
" xxx,	-	-	-	-	-	"	1 38
" 17,	-	-	-	-	-	"	1 50
" 3,	-	-	-	-	-	"	1 62
" 45,	-	-	-	-	-	"	1 88
" 63,	-	-	-	-	-	"	2 25

FARLEY FLUE BRUSH

Is sold by all the leading Hardware Houses in the United States.



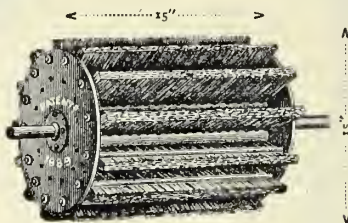
(20-inch Brush.)

We make any diameter from 1½ to 24 inches.
Standard length about 6 inches.
Use leather washers for cold flues.
Use metal washers for hot flues.
In ordering, give inside diameter of flue.
Every brush is made inside of a standard tube.

PRICES:

With leather washers, per inch diameter, . \$1.00
" metal " " " . 1.25

ROTARY STEEL-WIRE CLEANING BRUSH.

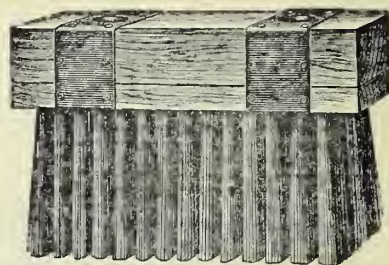


Price, \$45.00

The above brush, without adjustable table, made any length or diameter required. The supporting bars to each row of wires prevent them from snapping, and can be adjusted lower when bristles wear down.

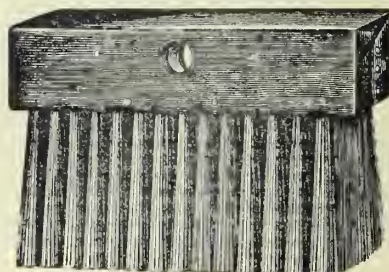
PRICES ACCORDING TO SIZES.

TWO-HANDLE STEEL-WIRE MILL BROOM.



Price per doz., \$12.00

IRON-BOUND STEEL-WIRE MILL BROOM.



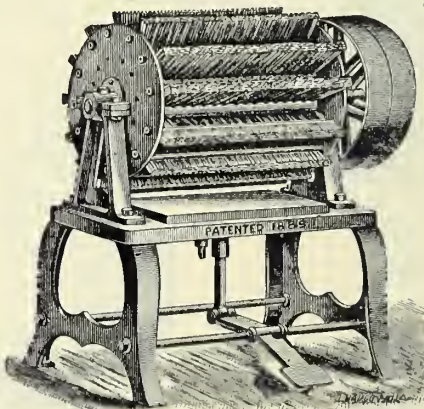
Price per doz., \$13.50

STEEL-WIRE CLEANING BRUSH.



1	inch, 4 row	per doz., \$3.50
2	" 4 "	" 3.75
2½	" 4 "	" 4.00
3	" 4 "	" 4.50
3½	" 4 "	" 4.75
4	" 4 "	" 5.00
3	" 5 "	" 6.00
3½	" 5 "	" 6.50
4	" 5 "	" 7.00

ROTARY STEEL-WIRE CLEANING BRUSH.



With adjustable table; especially adapted for scaling in shovel factories, and other steel or iron plates. Can be made any size to suit plates to be scaled.

Give length and diameter of brush when writing for price.

In ordering, give standard size of flue, which is outside measurement.



FARLEY PATENT FLUE BRUSH.

For cleaning tubes and flues, this latest invention excels all others in use. Its complete, compact, symmetrical and effective qualities cannot be surpassed.

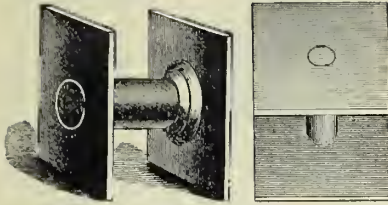
PRICES:

With Leather Washers, per inch diam., . \$1.00
" Metal " " " . 1.25

BRUSHES UNDER 2 INCHES, SAME PRICE AS 2-INCH.

With strap handles, 25 cents per dozen extra.

Double Head Chaplets



With Square or Round Head.

PRICE PER 100.

DIAMETER HEAD 1 IN.		DIAMETER HEAD 1 IN.	
DIAMETER STEM 3-16 IN.		DIAMETER STEM 3-16 IN.	
Length of Stem.			
$\frac{1}{2}$ in. @	\$2.60	$1\frac{1}{2}$ in. @	\$2.76
$\frac{3}{4}$ " @	2.60	$1\frac{3}{4}$ " @	2.76
$\frac{1}{2}$ " @	2.60	$1\frac{1}{2}$ " @	2.82
$\frac{3}{4}$ " @	2.60	$1\frac{3}{4}$ " @	2.82
$\frac{1}{2}$ " @	2.60	2 " @	2.85
$\frac{3}{4}$ " @	2.67	$2\frac{1}{2}$ " @	2.98
$\frac{1}{2}$ " @	2.70	$2\frac{1}{2}$ " @	2.97

1-4 or 5-16 Stems made to order.

Tinned and Silvered Stock to Order.

Annealed Wire Switch Brush.



For Cleaning Castings.

The wires do not break off but wear off gradually. Will reach places where the ordinary wire brush fails.

Price, \$4.00 per doz.

FOUNDRY BUCKETS



GALVANIZED IRON.

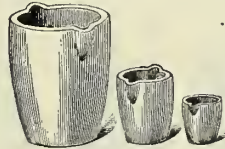
3 Gal.	\$6.75 per doz
$3\frac{1}{2}$ "	8.00 "
4 "	9.00 "
$3\frac{1}{2}$ " extra heavy	15.00 "
4 " " "	21.00 "



CEDAR WOOD.

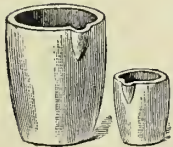
$3\frac{1}{2}$ Gal.	\$16.50 per doz.
4 "	19.10 "

CRUCIBLES



PHILADELPHIA MAKE.

Price according to Quantity.



CRUCIBLES FOR MELTING BRASS.

For all numbers above No. 12, price according to quantity.

Discount,

SPRAYING BELLOWS.



For Sprinkling or Spraying Molasses, Water or other liquids on the Moulds.

Price, \$5.00 Each.

FOUNDRY SWABS



MADE OF LONG FLAX.

Price per doz.....@ \$3.00

Moulders' Patent Raw Hide Mallets.
LIST OF PRICES.



No.	Diam.	Length.	Weight.	Per Doz.
0	1 in.	$2\frac{1}{2}$ in.	$1\frac{1}{2}$ oz.	\$ 5 75
1	$1\frac{1}{4}$ "	$2\frac{3}{4}$ "	$3\frac{1}{4}$ "	7 20
2	$1\frac{1}{2}$ "	3 "	6 "	8 64
3	$1\frac{3}{4}$ "	$3\frac{1}{2}$ "	$7\frac{1}{2}$ "	10 08
4	2 "	$3\frac{1}{2}$ "	10 "	12 96
5	$2\frac{1}{4}$ "	$4\frac{1}{2}$ "	21 "	28 80
6	$2\frac{3}{4}$ "	$4\frac{1}{2}$ "	23 "	36 00

These are light Mallets, made entirely of hide, (except the handle), and suited to a variety of uses.

BENCH RAMMERS.



$3\frac{1}{2}$ in. Face	\$1.00 per pair.
4 "	1.20 "
$3\frac{1}{2}$ " Brass Tips.....	1.75 "
4 " "	2.00 "

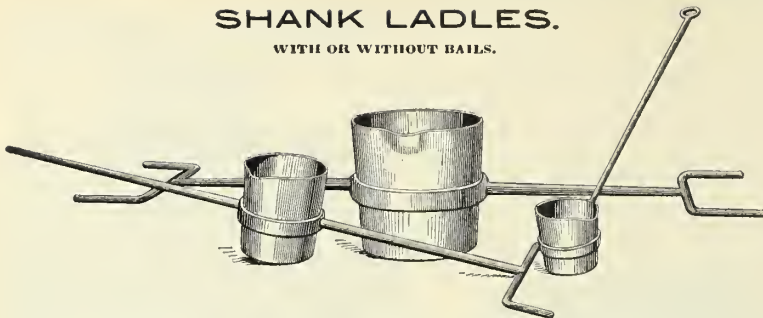
Hawley Adjustable Clamp.



Is made of malleable IRON thoroughly tested before leaving factory, and obviates the necessity of having a variety of sizes on hand:

No. 1 for $7\frac{1}{2}$ to 11 inch flask	\$ 4.80 per doz.
No. 2 " 9 " 14 " "	7.20 " "
No. 3 " $13\frac{1}{2}$ " 24 " "	18.00 " "

LADLES, SAND SIFTERS, &c.
SHANK LADLES.
 WITH OR WITHOUT BAILS.



These ladles are made of wrought iron, well braced, durable and light in weight. We keep several makes and styles on hand. The shanks, bowls and bails also sold separately if desired. Prices furnished on application.



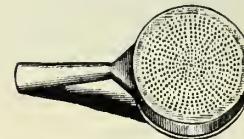
STAND-UP SAND AND COAL SCREEN.

PRICES.

30 inches . . . \$15.80
 24 " . . . 10.50

Discount,

TIN PARTING SAND DUSTERS.



For hardware and stove shops.

Block tin, per doz., \$12.00

Discount,

LADLE BOWLS.



CAST IRON,
\$12.00



CAST IRON,
\$6.25



CAST IRON,
\$4.50



CAST IRON,
\$1.10



CAST IRON,
\$1.10

MALL. IRON,
\$2.10

MALL. IRON,
\$2.10

We also have a 900-lb. capacity cast iron bowl; price \$18.75. 1200-lb. capacity, \$22.00 each.

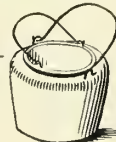


SAWYER'S MAGNETIC SEPARATOR.

To separate Iron Turnings, etc., from Brass, etc.

No. 1 machine . . \$290.00
 No. 2 " . . . 505.00

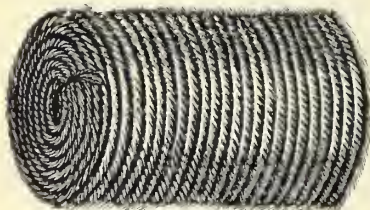
The No. 1 machine is large enough for ordinary shops.



GLUE POTS.

Price according to size.

HAY ROPE.

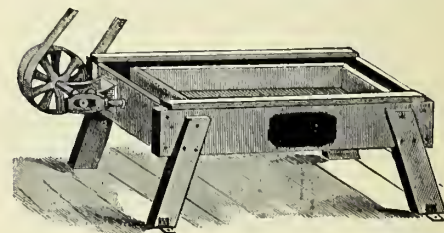


Price per spool . . . \$3.00

Discount,

The hay rope forms its own spool; made in 1/2, 3/4, 1 and 1 1/4 inch. Long salt hay in bales for making hay rope in stock.

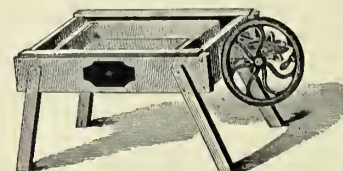
STEAM POWER SAND SIFTER.



A large number of these are in use. Size of sieve, bottom 54 by 19 inches, motion 3 inches. Price complete, with one sieve, \$165.00. Extra sieves made to order.

Discount,

HAND SIFTER.



Size of sieve, bottom 30 by 19 inches. Price, with one sieve \$57.00. Extra sieves made to order.

WIRE ROPE AND FASTENINGS.

NEW LIST, SEPTEMBER 1, 1894. STANDARD HOISTING ROPE. With 19 Wires to the Strand.

Trade number.	Price per foot in cents.	Diameter.	Circumference in inches.	Weight per foot in pounds of rope with hemp core.	Breaking strain in tons of 2000 lbs.	Proper working load in tons of 2000 lbs.	Circumference of new Manila rope of equal strength.	Min. size of drum or sheave in feet.
1	76	2 1/4	6 3/4	8.00	74	15	13	13
2	60	2 1/2	5 5/8	5.30	65	13	12	12
3	52	2 3/4	5 1/2	4.10	54	11	12	10
4	41	3 1/4	5 1/8	3.65	39	8	10	8 1/2
5	37	3 1/2	4 7/8	3.00	33	7	9	7 1/2
6	26	3 3/4	4 3/4	2.50	27	6	8 1/2	7
7	21	4 1/4	3 3/4	2.00	20	5	7 1/2	6 1/2
8	16	4 1/2	3 3/8	1.88	16	4	6 1/2	6
9	12	4 3/4	3 1/2	1.20	11.50	3	5 1/2	4 1/2
10	10	5 1/4	2 3/4	0.88	8.64	2 1/2	4 1/2	4
10 1/2	7 1/2	5 1/2	2 1/2	0.60	5.13	2	3 1/2	3 1/2
10 3/4	6 3/4	5 3/4	2 1/4	0.48	4.27	1 3/4	3 1/4	3 1/4
10 1/2	5 1/2	5 1/2	2 1/4	0.39	3.48	1 3/4	2 3/4	2 3/4
10 3/4	4 3/4	5 3/4	2 1/4	0.29	3.00	1 3/4	2 1/4	2 1/4
10 1/2	4 1/4	5 1/4	2 1/4	0.23	2.50	1 3/4	2 1/4	1 1/2

NOTE.—Siemens-Martin Steel Rope same price as Iron Rope.

Trade number.	Price per foot in cents.	Diameter.	Circumference in inches.	Weight per foot in pounds of rope with hemp core.	Breaking strain in tons of 2000 lbs.	Proper working load in tons of 2000 lbs.	Circumference of new Manila rope of equal strength.	Min. size of drum or sheave in feet.
1	92	2 1/4	6 3/4	8.00	155	31	8 1/2	8 1/2
2	72	2 1/2	5 5/8	5.30	125	25	8	8
3	60	2 3/4	5 1/2	4.10	106	21	7 1/4	7 1/4
4	48	3 1/4	5 1/8	3.65	77	15	6 1/4	6 1/4
5	43	3 1/2	4 7/8	3.00	63	12	5 1/4	5 1/4
6	36	3 3/4	4 3/4	2.50	52	10	4 1/2	4 1/2
7	30	4 1/4	3 3/4	2.00	42	8	4 1/2	4 1/2
8	25	4 1/2	3 3/8	1.88	33	5	4 1/2	4
9	19	4 3/4	3 1/2	1.20	25	5	3 1/2	3 1/2
10	16	5 1/4	2 3/4	0.88	18	3 1/2	3	3
10 1/2	11 1/2	5 1/2	2 1/2	0.60	12	2 1/2	2 1/2	2 1/2
10 3/4	9	5 3/4	2 1/4	0.48	9	2 1/4	2 1/4	2 1/4
10 1/2	8	5 1/2	2 1/4	0.39	7	2 1/4	2 1/4	2 1/4
10 3/4	7 1/2	5 3/4	2 1/4	0.29	5 1/2	2 1/4	2 1/4	2 1/4
10 1/2	6 3/4	5 1/4	2 1/4	0.23	4 1/2	2 1/4	2 1/4	1 1/2
10 3/4	6	5 1/4	2 1/4	0.23	4 1/2	2 1/4	2 1/4	1 1/2

NOTE.—When made with Wire Center, the price per foot is 10 per cent. extra.
NOTE.—When either the Iron or Steel rope named above is galvanized, 7 1/2 per cent. less discount.

TRANSMISSION AND STANDING ROPE.

With 7 Wires to the Strand.

Trade Number.	Price per foot in cents.	Diameter.	Circumference.	Weight per foot in pounds of rope with hemp core.	Breaking strain in tons of 2000 lbs.	Proper working load in tons of 2000 lbs.	Circumference of new Manila rope of equal strength.	Min. size of drum or sheave in feet.
11	33	1 1/2	4 1/4	3.37	35	9	10	13
12	28	1 3/4	4 1/4	2.77	30	7 1/2	9	12
13	23	1 3/4	3 3/4	2.28	25	6 1/4	8 1/2	10 1/2
14	19	1 3/4	3 3/4	1.82	20	5 1/4	7 1/2	9 1/4
15	15	1 3/4	3	1.50	16	4	6 1/2	8 1/2
16	11 1/2	1 3/4	2 3/4	1.12	12.3	3	5 1/4	7 1/2
17	9	1 3/4	2 3/4	0.92	8.8	2 1/2	4 1/2	6 1/2
18	7 1/2	1 3/4	2 3/4	0.70	7.6	2 1/2	4 1/2	6
19	6 1/2	1 3/4	2 3/4	0.57	5.8	2 1/2	4 1/2	5 1/2
20	5	1 3/4	2 3/4	0.41	4.1	1	3 1/2	4 1/2
21	4 1/2	1 3/4	2 3/4	0.31	2.83	1	3 1/2	4
22	3 1/2	1 3/4	2 3/4	0.23	2.18	1	3 1/2	4
23	3 1/2	1 3/4	2 3/4	0.21	1.65	1	2 1/2	3 1/2
24	2 1/2	1 3/4	2 3/4	0.16	1.38	1	2 1/2	3 1/2
25	2	1 3/4	2 3/4	0.125	1.03	1	1 1/2	2 1/2

NOTE.—Siemens-Martin Steel Rope same price as Iron Rope.

Trade Number.	Price per foot in cents.	Diameter.	Circumference.	Weight per foot in pounds of rope with hemp core.	Breaking strain in tons of 2000 lbs.	Proper working load in tons of 2000 lbs.	Circumference of new Manila rope of equal strength.	Min. size of drum or sheave in feet.
11	39	1 1/2	4 1/4	3.37	52	13	13	8 1/2
12	33	1 3/4	4 1/4	2.77	52	10	12	8
13	28	1 3/4	3 3/4	2.28	44	9	11	7 1/4
14	23	1 3/4	3 3/4	1.82	36	7 1/2	10	6 1/4
15	18	1 3/4	3	1.50	30	6	9	5 1/4
16	14	1 3/4	2 3/4	1.12	22	4 1/2	8	5
17	10	1 3/4	2 3/4	0.92	17	3 1/2	7	4 1/2
18	8 1/2	1 3/4	2 3/4	0.70	14	3	6	4
19	7	1 3/4	2 3/4	0.57	11	2 1/2	5 1/4	3 1/2
20	5 1/2	1 3/4	2 3/4	0.41	8	1 3/4	4 1/2	3
21	4 1/2	1 3/4	2 3/4	0.31	6	1 1/2	4	2 1/2
22	4	1 3/4	2 3/4	0.23	4 1/2	1 1/2	3 1/2	2 1/2
23	3 1/2	1 3/4	2 3/4	0.21	4	1 1/2	3 1/2	2
24	2 1/2	1 3/4	2 3/4	0.16	3	1 1/2	2 1/2	1 1/2
25	2 1/2	1 3/4	2 3/4	0.125	2	1 1/2	2 1/2	1 1/2

NOTE.—When made with Wire Center, the price per foot is 10 per cent. extra.

NOTE.—When either the Iron or Steel rope named above is galvanized, 7 1/2 per cent. less discount.



GALVANIZED STEEL WIRE STRAND

For Smokestack Guys, Signal Strand, Trolley Line Span Wire and other Purposes.

This strand is composed of 7 wires, twisted together into a single strand.

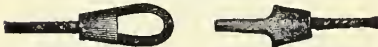
Diameter.	Weight per 100 feet.	Estimated breaking strength.	Price per 100 feet.
1/2 in.	51 lbs.	8,320 lbs.	\$2 25
3/4 in.	48	7,500	2 05
7/8 in.	37	6,000	1 65
1 in.	30	4,700	1 40
1 1/8 in.	21	3,300	1 05
1 1/4 in.	18	2,600	90
1 1/2 in.	15	2,250	75
1 3/4 in.	11 1/2	1,750	50
2 in.	8 1/2	1,300	50
2 1/8 in.	6 1/2	1,000	45
2 1/4 in.	5	700	35
2 3/8 in.	4 1/2	525	28
2 1/2 in.	3 1/2	375	22
2 3/4 in.	2 1/2	320	20

For special purposes these strands can be made of 50 to 100 per cent. greater tensile strength. When used to run over sheaves or pulleys, the use of soft iron stock is advisable. The special steel and soft iron strands are at special prices, furnished on application.

WIRE ROPE FASTENINGS.

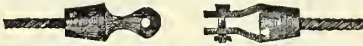
Made from Best Charcoal Iron.

CLOSED SOCKETS.



For Steel Rope.	Iron Rope.	For Steel Rope.	Iron Rope.
Dia. Loose. Fast'd	Loose. Fast'd	Dia. Loose. Fast'd	Loose. Fast'd
2 1/4 \$14 25 \$16 50	\$11 25 \$13 50	1 1/2 \$3 25 \$4 50	\$2 25 \$3 50
2 1/2 12 50 14 25	9 00 11 00	1 3/4 2 75 3 75	2 00 3 00
2 3/4 10 75 12 50	7 50 9 25	2 1/2 2 25 3 25	1 50 2 50
3 1/4 9 00 10 50	6 00 7 50	1 5/8 1 85 2 75	1 20 2 10
3 1/2 7 50 9 00	4 50 6 00	1 3/4 1 50 2 25	1 00 1 75
3 3/4 6 00 7 25	3 25 4 50	1 1/2 1 15 1 60	75 1 20
4 1/4 4 50 5 75	2 75 4 00		

OPEN SOCKETS.



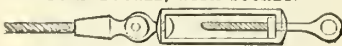
For Steel Rope.	Iron Rope.	For Steel Rope.	Iron Rope.
Dia. Loose. Fast'd	Loose. Fast'd	Dia. Loose. Fast'd	Loose. Fast'd
2 1/4 \$16 50 \$19 00	\$12 50 \$15 00	1 1/2 \$4 00 \$5 00	\$3 00 \$4 00
2 1/2 14 25 16 25	10 50 12 50	1 3/4 3 25 4 25	2 50 3 50
2 3/4 12 50 14 00	9 00 10 50	2 1/2 2 75 3 75	2 00 3 00
3 1/4 10 50 12 00	7 25 8 75	1 5/8 3 45 4 75	2 00 3 00
3 1/2 8 75 10 25	5 50 7 00	1 3/4 2 00 2 75	1 50 2 25
3 3/4 7 25 8 50	4 00 5 25	1 1/2 1 70 2 30	1 35 2 00
4 1/4 5 50 6 50	3 25 4 50	1 1/4 1 50 2 00	1 20 1 55

SWIVEL HOOKS.



For Steel Rope.	Iron Rope.	For Steel Rope.	Iron Rope.
Dia. Loose. Fast'd	Loose. Fast'd	Dia. Loose. Fast'd	Loose. Fast'd
2 1/4 \$19 50 \$21 75	\$16 00 \$18 25	1 1/2 \$5 25 \$6 25	\$4 25 \$5 25
2 1/2 17 50 19 50	14 25 16 25	1 3/4 4 50 5 50	3 75 4 75
2 3/4 15 50 17 50	12 00 14 00	2 1/2 4 25 5 15	3 35 4 25
3 1/4 12 75 14 25	9 50 11 00	1 5/8 4 65 5 05	4 00
3 1/2 9 75 11 25	6 75 8 25	1 3/4 3 35 4 15	2 90 3 70
3 3/4 8 25 9 50	5 50 6 75	1 1/2 3 00 3 60	2 65 3 25
4 1/4 6 50 7 50	4 50 5 50	1 1/4 2 65 3 10	2 25 2 70

TURN BUCKLE, WITH SOCKET.



Prices according to size and weight.

HOOK AND SOCKET.



For Steel Rope.	Iron Rope.	For Steel Rope.	Iron Rope.
Dia. Loose. Fast'd	Loose. Fast'd	Dia. Loose. Fast'd	Loose. Fast'd
1 1/4 \$6 25 \$7 25	\$4 30 \$5 30	3/4 \$3 05 \$3 85	\$2 30 \$3 10
1 1/2 5 00 6 00	3 75 4 75	1 1/8 2 65 3 40	2 00 2 75
1 3/4 4 15 5 10	8 20 4 15	1 1/2 2 55 3 10	1 90 2 45
2 3/8 3 55 4 50	2 75 8 70	1 3/4 1 90 2 45	1 50 2 05



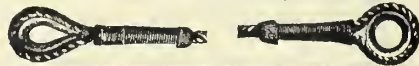
For Steel Rope.	Iron Rope.	For Steel Rope.	Iron Rope.
Dia. Loose. Fast'd	Loose. Fast'd	Dia. Loose. Fast'd	Loose. Fast'd
1 1/4 \$3 00 \$5 25	\$2 55 \$4 50	3/4 \$1 30 \$2 80	\$1 15 \$2 25
1 1/2 2 50 4 35	1 90 3 60	1 1/8 1 20 2 50	1 00 2 00
1 3/4 1 90 3 75	1 50 3 00	1 1/2 95 2 10	90 1 80
2 1 1 50 3 25	1 30 2 55	1 3/4 80 1 70	75 1 40

HOOK AND THIMBLE.



For Steel Rope.	Iron Rope.	For Steel Rope.	Iron Rope.
Dia. Loose. Fast'd	Loose. Fast'd	Dia. Loose. Fast'd	Loose. Fast'd
1 1/4 \$3 00 \$5 25	\$2 55 \$4 50	3/4 \$1 30 \$2 80	\$1 15 \$2 25
1 1/2 2 50 4 35	1 90 3 60	1 1/8 1 20 2 50	1 00 2 00
1 3/4 1 90 3 75	1 50 3 00	1 1/2 95 2 10	90 1 80
2 1 1 50 3 25	1 30 2 55	1 3/4 80 1 70	75 1 40

OVAL AND ROUND THIMBLES, SPLICED IN.



For Steel Rope.	Iron Rope.	For Steel Rope.	Iron Rope.
Diam. Fast'd.	Fastened.	Diam. Fast'd.	Fastened.
1 1/4 \$3 00	\$3 00	3/4 \$1 30	\$1 30
1 1/2 2 50	2 50	1 1/8 1 20	1 15
1 3/4 1 90	1 90	1 1/2 1 05	1 05
2 1 1 50	1 50	1 3/4 85	85

SOCKET, WITH CHAIN.



Prices according to size and length of chain.

EXTRA HEAVY OVAL WIRE ROPE THIMBLES.

Galvanized.



Width of Score.	Circumference of Rope.	Price, each.
1/4 in.	3/4 in.	\$0 08
3/8 in.	1 in.	08
1/2 in.	1 1/2 in.	09
5/8 in.	2 in.	11
3/4 in.	2 1/2 in.	12
7/8 in.	2 3/4 in.	12
1 in.	3 in.	14
1 1/4 in.	3 1/2 in.	15
1 1/2 in.	3 3/4 in.	19
1 3/4 in.	4 in.	22
1 1/2 in.	4 1/2 in.	26
1 3/4 in.	5 in.	30

Larger and special thimbles on application.

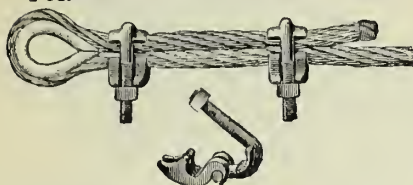
PATENT WIRE ROPE CLAMPS.



For 1 1/4 in. circ. rope.	For 2 1/4 in. circ. rope.
1 1/2 " " " " " "	3 " " " " " "
1 3/4 " " " " " "	3 1/2 " " " " " "

WIRE ROPE CLIPS, LOCOMOTIVE SWITCHING AND WRECKING ROPES, TACKLE BLOCKS, HOISTING WHEELS AND SHEAVES.

THE "JUPITER" CLIP FOR WIRE ROPE AND STRAND.



Compact. Patent applied for. Inexpensive. Simple.

PRICE LIST.

For 1/4 in. diam. rope.....	\$0 19	For 3/8 in. diam. rope.....	\$0 34
" 1/2 " " ".....	19	" 1 " " ".....	38
" 3/4 " " ".....	23	" 1 1/4 " " ".....	44
" 1 " " ".....	28	" 1 3/4 " " ".....	49
" 1 1/4 " " ".....	31	" 2 " " ".....	53

The "Jupiter" Clip is practically one part, as it can be applied by simply loosening the nut and swinging the bolt back, putting in rope to be held and then swinging the bolt forward and tightening the nut.

THE "CROSBY" WIRE ROPE CLIP.

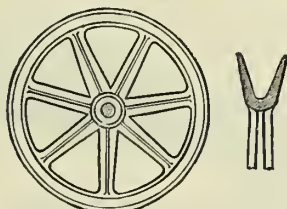


A Light, Durable and Convenient Wire Rope, Fastening.

EASILY APPLIED.

1/4 in. diam. rope.....	\$0 21	1/2 in. diam. rope.....	\$0 38
" 1/2 " " ".....	21	" 1 " " ".....	42
" 3/4 " " ".....	25	" 1 1/4 " " ".....	49
" 1 " " ".....	30	" 1 3/4 " " ".....	54
" 1 1/4 " " ".....	34	" 2 " " ".....	59

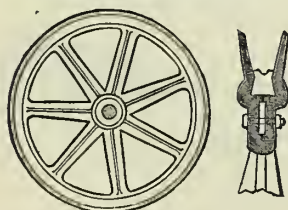
HEAVY IRON HOISTING WHEELS.



6 feet diameter, 1100 lbs.	Price, bored to fit shaft.....	
5 " " " " " " " "	886 lbs.	" " " " " " " "
4 " " " " " " " "	622 lbs.	" " " " " " " "
3 " " " " " " " "	367 lbs.	" " " " " " " "

Special prices for larger wheels, with either cast or wrought-iron arms.

HEAVY WOOD-LINED IRON HOISTING WHEELS.



6 feet diameter, 1300 lbs.	Price, bored to fit shaft.....	
5 " " " " " " " "	975 lbs.	" " " " " " " "
4 " " " " " " " "	700 lbs.	" " " " " " " "
3 " " " " " " " "	470 lbs.	" " " " " " " "

Special prices for larger wheels, with wrought or cast-iron arms.

LOCOMOTIVE SWITCHING AND WRECKING ROPES.

Cast Steel or Iron.



Diameter of Rope... 1 1/4 1 3/4 1 1/2 1 1/4 1 1/2 3/4 inches.
Breaking Strength... 75 60 50 40 32 24 18 tons.

Made up in lengths of 25 or 30 feet, or greater lengths if required, with suitable fastenings on ends

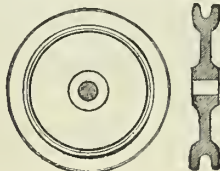
For Switching Ropes—The fastenings are made of size and strength to suit the use intended.

For Wrecking Ropes—Hooks and links are made extra heavy, to stand a strain equal to the strength of the rope.

Prices on application.

SOLID IRON SHEAVES.

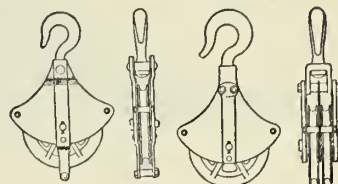
For Elevators and Derricks.



30 in. diam., each.....	18 in. diam., each.....
28 " " " ".....	16 " " " ".....
26 " " " ".....	14 " " " ".....
24 " " " ".....	12 " " " ".....
22 " " " ".....	10 " " " ".....
20 " " " ".....	8 " " " ".....

IRON TACKLE BLOCKS.

Phosphor-Bronze Bushings.



SINGLE SHEAVE.

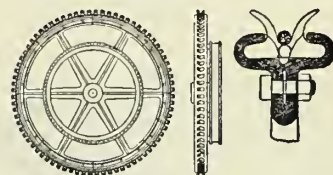
10 in. diameter, each.....	\$17 00
12 " " " ".....	19 00
14 " " " ".....	21 00
16 " " " ".....	36 00
18 " " " ".....	40 00

DOUBLE SHEAVE.

10 in. diameter, each.....	\$26 00
12 " " " ".....	29 00
14 " " " ".....	31 00
16 " " " ".....	50 00
18 " " " ".....	56 00

Triple and Quadruple Sheaves special prices.

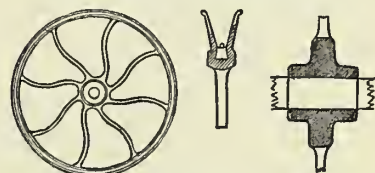
WIRE ROPE GRIP WHEELS.



Sizes 4, 5, 6, 7 and 8 feet diameter.

Prices on application.

WHEELS FOR TRANSMISSION OF POWER BY WIRE ROPE.



Wheels Bored to Fit Shaft, and Lined with Patent Rubber.

1 1/2 ft. diam., each.....	\$5 50	7 ft. diam., each.....	\$72 00
2 " " " ".....	7 50	8 " " " ".....	95 00
2 1/2 " " " ".....	10 50	9 " " " ".....	120 00
3 " " " ".....	15 00	10 " " " ".....	150 00
4 " " " ".....	24 00	11 " " " ".....	220 00
5 " " " ".....	37 00	12 " " " ".....	235 00
6 " " " ".....	59 00		

Special prices for larger wheels.

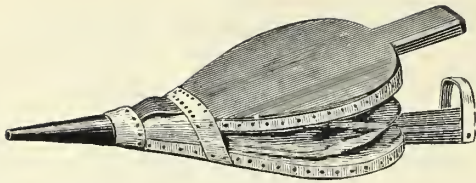
PATENT RUBBER LINING FOR TRANSMISSION WHEELS.



Above show reduced sections.

BELLOWS AND TROWELS.

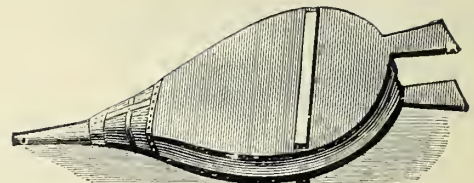
FIG. 1584.



HAND BELLOWS.

	5	6	7	8	9	10	12 inches.
Price,	\$7.00	8.00	9.00	10.00	11 00	12.00	14.00 per dozen

FIG. 1585.



MOULDERS' BELLOWS.

	9	10	11	12	13	14	15 inches.
Price,	\$15.00	17.00	20.00	24.00	26.00	28.00	33.00 per dozen

STANDARD BLACKSMITHS' BELLOWS.

	18 to 24	26	28	30	32	34	36	38	40	42	44 inches
Price,	\$10.00	11.00	12.00	13.00	14.00	16.00	18.00	20.00	23.00	27.00	32.00 each

FIG. 1586.

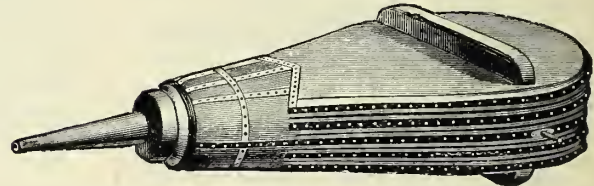
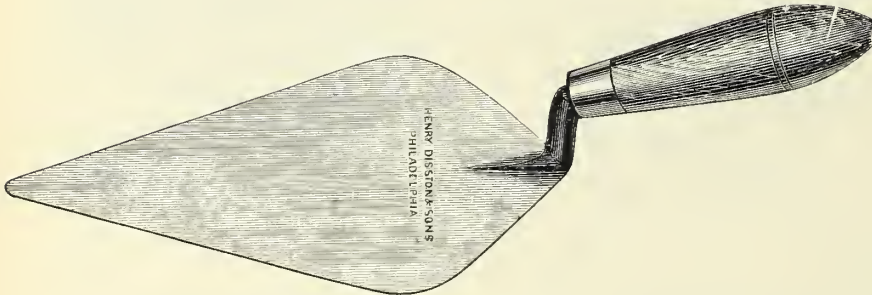


FIG. 1587.



BRICK TROWEL.

LONDON PATTERN.

7½	8	8½	9 inches.
\$7.50	8.00	8.50	9.00 per dozen
9½	10	10½	11 inches.
\$9.50	10.00	10.50	11.00 per dozen
11½	12	12½	13 inches.
\$11.50	12.00	12.75	13.50 14.25 15.00 per dozen

BRICK TROWEL.

PHILADELPHIA PATTERN.

7½	8	8½	9 inches.
\$9.00	9.50	10.00	10.50 11.00 per dozen
10	10½	11	11½ inches.
\$11.50	12.00	12.50	13.00 13.50 per dozen
12½	13	13½	14 inches.
\$14.25	15.00	15.75	16.50 per dozen

FIG. 1588.

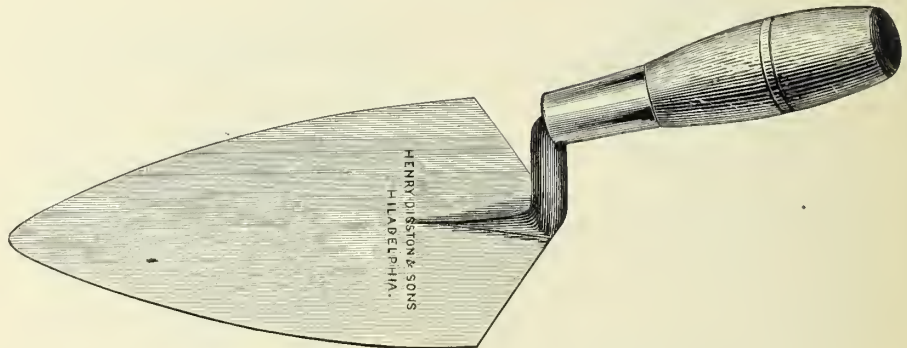
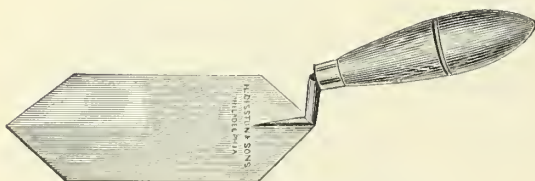


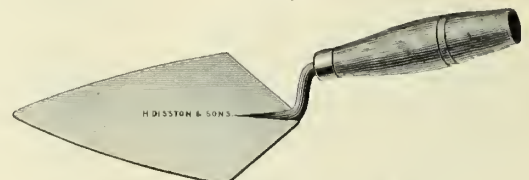
FIG. 1589.



BRICKLAYERS' POINTING TROWEL.

Price,	-	-	-	-	-	\$5.25 per dozen	\$4.25
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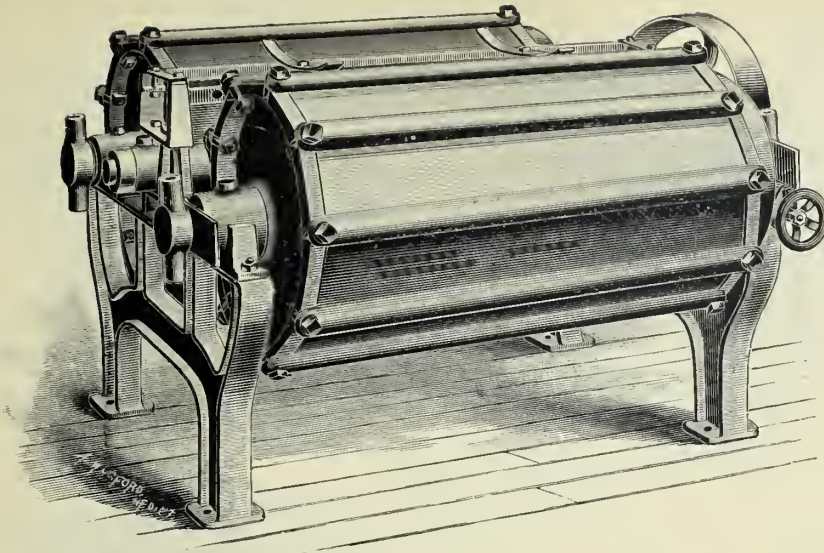
FIG. 1590.



POINTING TROWEL, SOLID SHANK.

4½	5	5½	6 inches.
4.50	4.75	5.00	5.25 per dozen

FIG. 1591.



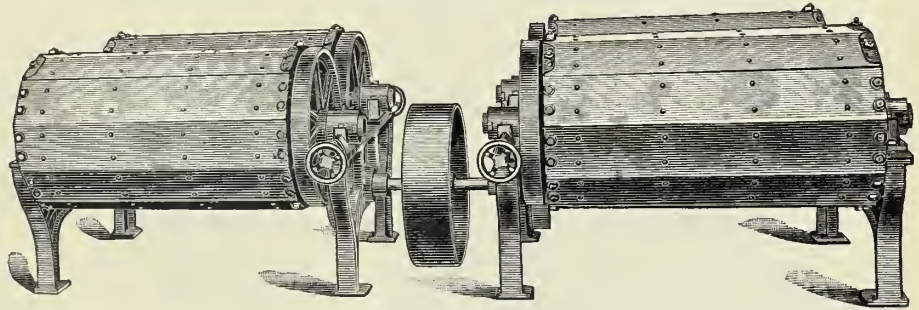
When partitioned into two compartments (of any desired length), each having its own independent door, a barrel of this kind becomes the same as two small barrels; but, it costs less and occupies less room. By extending the driving shaft, and setting up more frames, a long double line of barrels can be mounted and driven in this way.

No. of Plates.	Size.
10	22 x 38 inches.
10	22 x 44 "
12	26 x 38 "
12	26 x 44 "

STEEL PLATE, DOUBLE EXHAUST TUMBLING BARRELS, FRICTION GEARED.

FIG. 1592.

No. of Staves.	Size.	No. of Staves.	Size.
6	14 x 30 inches.	9	20 x 42 inches.
6	14 x 36 "	10	22 x 30 "
6	14 x 42 "	10	22 x 36 "
7	16 x 30 "	10	22 x 42 "
7	16 x 36 "	11	24 x 36 "
7	16 x 42 "	11	24 x 42 "
8	18 x 30 "	11	24 x 48 "
8	18 x 36 "	12	26 x 36 "
8	18 x 42 "	12	26 x 42 "
9	20 x 30 "	12	26 x 48 "
9	20 x 36 "		

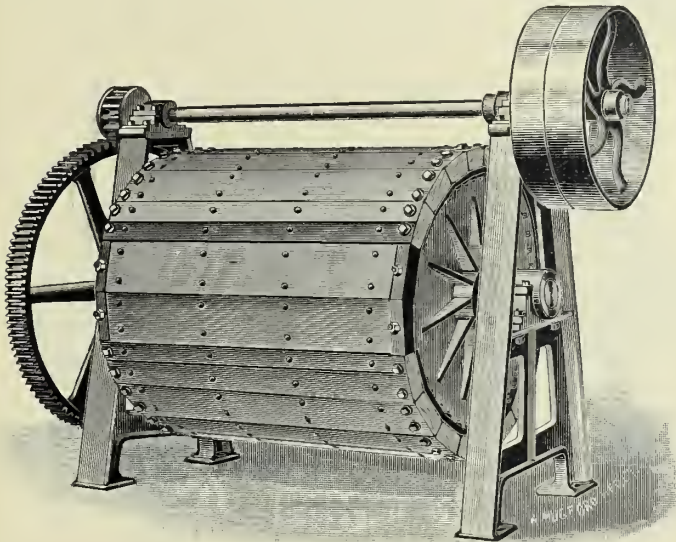


Size, 24 x 42 inches. Weight, 5,800 pounds.

SET OF FOUR TUMBLING BARRELS, EXHAUST OR NON-EXHAUST.

Friction geared, with hand wheels for stopping and starting each barrel, an excellent way of mounting and driving four heavily loaded barrels. Made in compartments to order. Prices on application.

FIG. 1593.

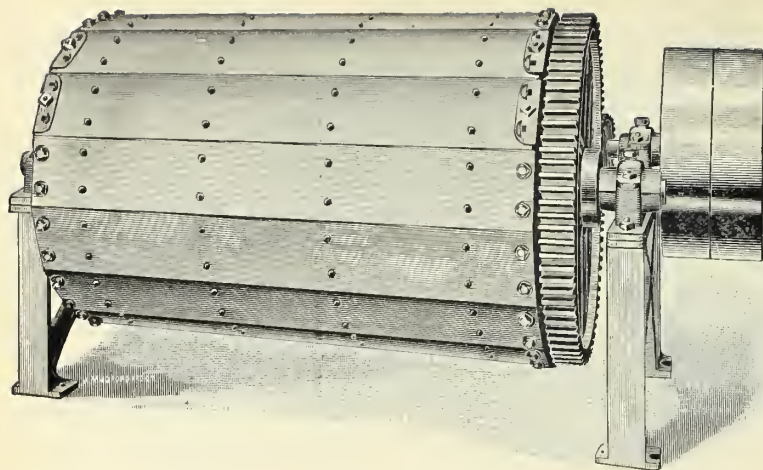


IMPROVED FOUNDRY TUMBLING BARREL.

These barrels have no shaft through them (none of our barrels have), against which the work could get wedged. In strength and capacity they are well adapted for large, heavy work; also for sprews and cupola dumpings.

No. of Staves.	Size Inside.	Approximate Weight.
20	45 x 48 inches	4780 pounds.
15	33 x 48 "	2330 "
14	30 x 48 "	2150 "
13	28 x 48 "	2000 "

FIG. 1594.



FOUNDRY RATTLERS.

We have had in use a number of foundry rattlers, of a form of construction usually found in most foundries. The results were so unsatisfactory that we have designed and constructed new rattlers, which have proven satisfactory.

These rattlers have iron frames, self oiling boxes, and are so encased as to keep all dust from bearings and the room.

These we are prepared to furnish in three sizes, as follows :

	Inside Diameter.	Length.	Weight, about
No. 1,	23½ inches	26 inches	2050 pounds
No. 2,	31½ inches	31½ inches	4800 pounds
No. 3,	31½ inches	52 inches	5700 pounds

Floor space, No. 1, 44 x 54 inches; No. 2, 58 x 64 inches; No. 3, 69 x 82 inches.

Additional information furnished on application.

FIG. 1596.

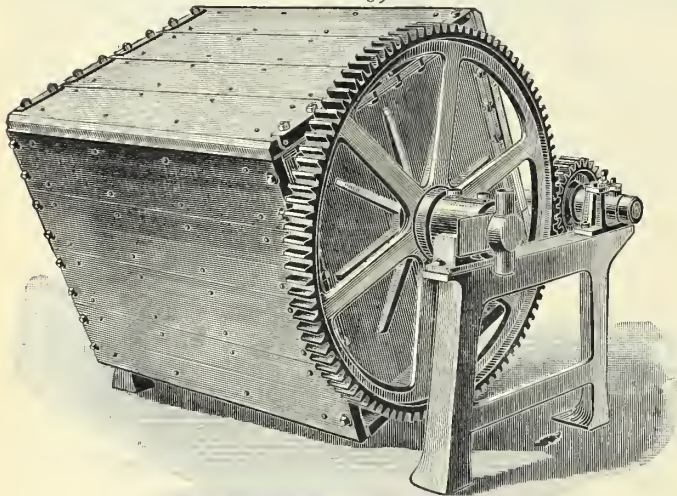
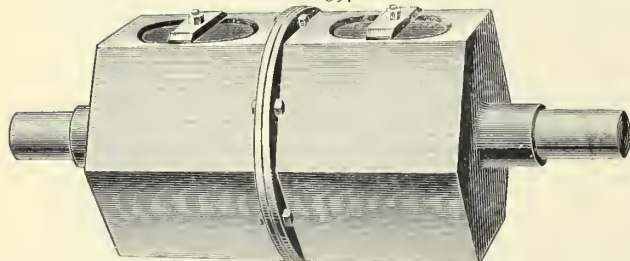


FIG. 1597.



TWO COMPARTMENT WATER POLISHING BARREL.

Each compartment 20 inches diameter, 16 inches long.

When so ordered, Water Polishing Barrels are provided with a gland for connecting a water pipe to supply a constant flow of water.

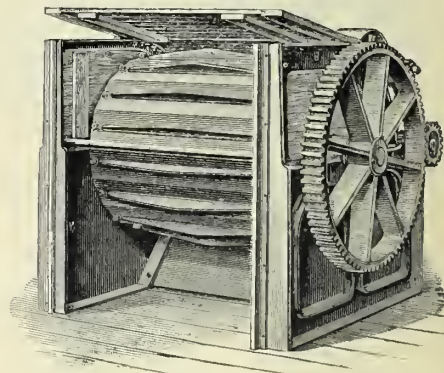
IMPROVED FOUNDRY TUMBLING BARREL.

Exhaust or Non-Exhaust.

No. of Staves.	Size.	Approximate Weight.
15.	33 x 48 inches.	2330 pounds.
14.	30 x 48 inches.	2150 pounds.
13.	28 x 48 inches.	2000 pounds.

Can be made longer or shorter. For large barrels, mounted singly, we recommend spur gearing, with tight and loose pulleys.

FIG. 1595.



BARREL FOR STOVE PLATES AND SIMILAR ARTICLES.

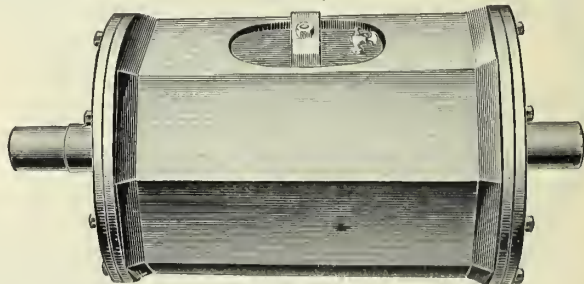
Patent Double Exhaust.

Size, 37 inches square, 48 inches long.

“ 31 inches square, 42 inches long.

“ 23 inches square, 42 inches long.

FIG. 1598.

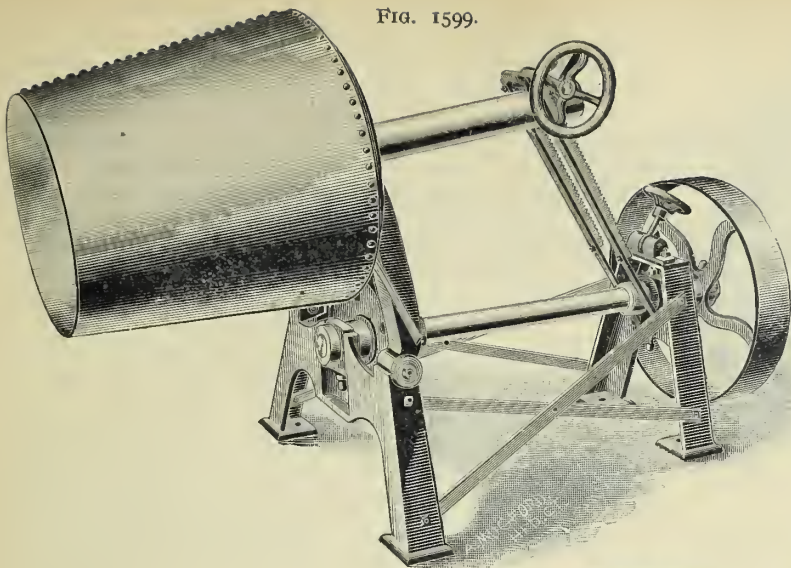


WATER POLISHING BARREL.

Size, 20 x 30 inches.

When this barrel is intended for dry rolling the door is made flush and full length.

FIG. 1599.



FRICTION GEARED OBLIQUE BARREL.

Running position. For wet or dry tumbling.

Dimensions of brass and steel barrels for oblique machines.

Diameter, 36 inches	Length, 31 inches
" 28 "	" 27½ "
" 24 "	" 25½ "
" 20 "	" 22 "
" 18 "	" 20 "
" 15 "	" 15 "

TUMBLING BARREL, FOR WET OR DRY TUMBLING.

Well adapted for Brass Castings.

Size, 26x30 inches. Weight, 1520 pounds.

FIG. 1600.

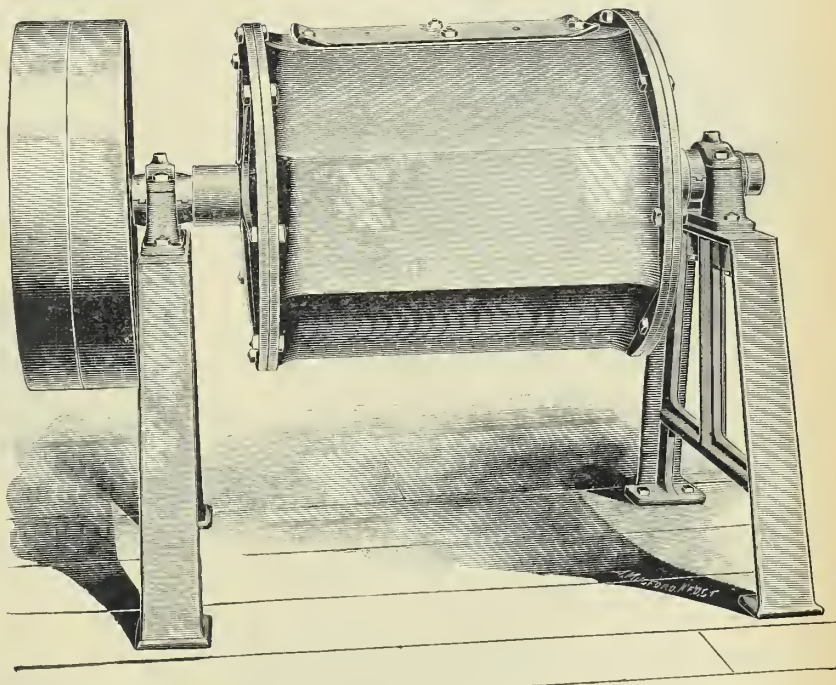
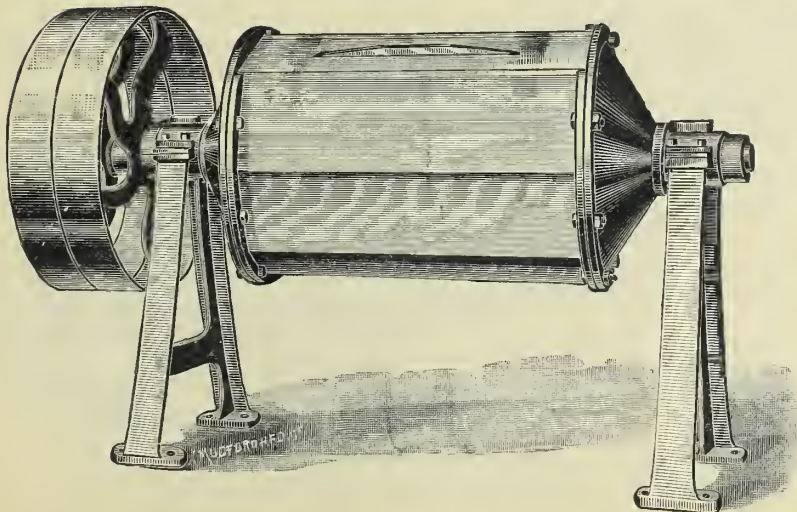


FIG. 1601.

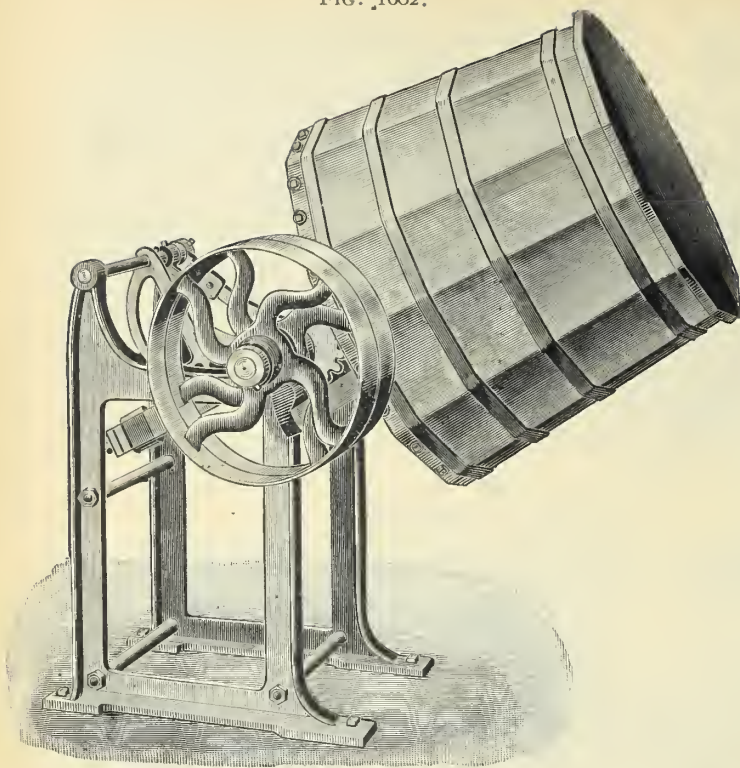


TUMBLING BARREL WITH CONVEX HEADS.

For dry rolling. Has full length flush door.

Body, 20 inches diameter, 30 inches long.

This barrel imparts three distinct motions to the goods, rolling, shaking, spreading, and does its work very rapidly.



IN POSITION FOR WORK.

TILTING TUMBLING BARRELS.

These barrels are made of hard wood, and can be used for both wet and dry tumbling.

By means of the lever these barrels can be adjusted to work at any angle. They are very strong, and are unexcelled for brightening goods, saving much buffing and burnishing.

Width of frame, 36 inches; height of frame, 38 inches; pulleys, 18 inch diameter by 4-inch face; diameter of barrel at bottom, inside, 30 inches; diameter of barrel at top, inside, 24 inches; depth of barrel, inside, 25½ inches; floor space, 3 x 5 feet; finished weight, 700 pounds. Price, \$75.00.

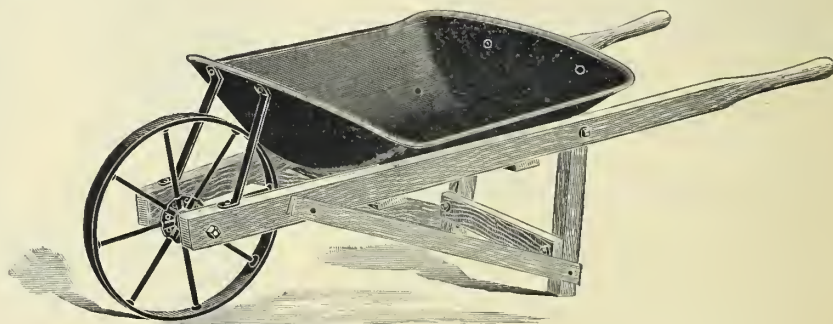
WHEELBARROWS.**WOOD, STEEL TRAY. JACOBS' WHEEL.**

The most substantial, cheapest, and best Steel Tray Barrow manufactured. Specially adapted for heavy work.

Steel wheel, 16½ inches diameter; tire, 1⅜ x ⅜ inches; steel spokes, ⅜ inch round; the tray, of No. 15 best steel, pressed from a single sheet, without joint, seam or rivet. Stronger and more durable than riveted iron trays of same thickness. The flange of tray is turned over a 5-16 steel rod, which passes entirely around the tray, giving a smooth finish to the edge of the bowl, preventing breaking, and stiffening and strengthening it. Size of tray: greatest length, 32 inches; greatest width, 33 inches; depth at wheel end, 11 inches; depth at handle end, 7½ inches.

No. 1.	Capacity, 3 cubic feet,	-	-	-	price, \$4 00
" 2.	" 4 " " "	-	-	-	" 4 25

FIG. 1603.

**WOOD, STEEL TRAY. JACOBS' WHEEL.****RAILROAD, OR CANAL BARROW.**

With Steel Spoke Wheel.

Same as above, but with Lewis or Jacobs' Patent Steel Wheel, as ordered.

Diameter of wheel, 16½ inches; wrought iron tire, 1⅜ inches wide, ⅜ inch thick; steel spokes, in Lewis' wheel ⅜ inch round, in Jacob's wheel, ⅝ x ¼; hub, 6 inches long, ½-inch bore; weight, 55 pounds. Price, per dozen, \$22.00.

FIG. 1605.

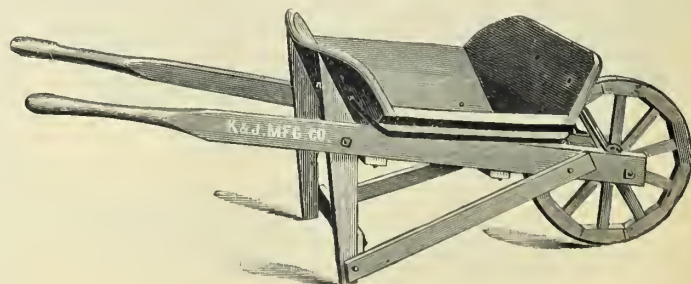
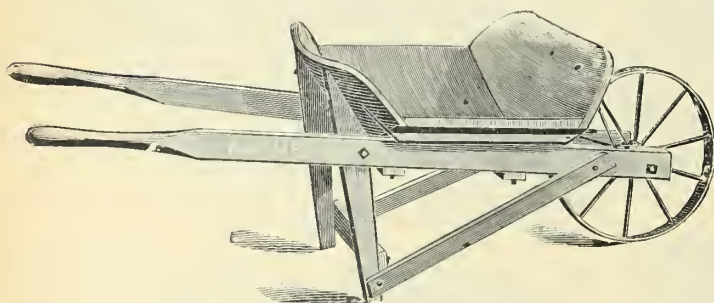
**BOLTED R. R. OR CANAL BARROW.**

FIG. 1604.

**RAILROAD OR CANAL BARROW.****BOLTED R. R. OR CANAL BARROW.**

Diameter of wheel, 17 inches; tire, 3-16 x 1⅛ inches; spokes, ⅞ x 1 inch; ½-inch axle bolt.

The barrow for railroad contractors.

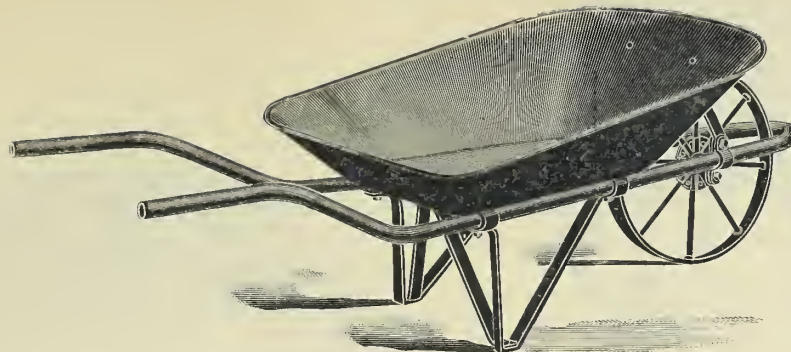
Knocks down completely for shipping, and is easily set up.

Weight, 50 pounds.

Price, - - - - - per dozen, \$20 00

WHEELBARROWS.

FIG. 1606.



TUBULAR STEEL FOUNDRY BARROW.

No. 9 Steel Foundry Barrow, with No. 15 Lewis Round Spoke Steel Wheel.

Wheels and leg braces on these barrows are same as Nos. 6 and 7. Intended for wheeling castings, hot irons, etc., and for general foundry and furnace use.

No. 8. Tray made of No. 12 steel. Size of tray, same as Nos. 4 and 6. Weight of barrow, 95 pounds. Price, each, \$14.00
 No. 9. Tray made of No. 12 steel. Size of tray, same as Nos. 5 and 7. Weight of barrow, 98 pounds. Price, each, 16.00

COAL AND COKE BARROWS.

The No. 15 Lewis Steel Wheels are 16½ inches in diameter, with iron tire 1¾ x ⅜ inches, and steel spokes ½ inch round, and extra heavy malleable hubs. The legs and leg braces are extra heavy.

No. 7. Same as our No. 7 Mining Barrow, shown on another page. Capacity, 215 to 250 pounds of coal. Greatest width of tray, 29 inches. Weight of barrow, 88 pounds. Price, each, \$14.25

No. 10. Tray of No. 13 steel. Capacity, 400 to 450 pounds of lump coal. Greatest width of tray, 33 inches. Weight of barrow, 109 pounds. Price, each, 20.00

No. 12. Tray made of No. 15 steel. Capacity, 5 bushels of coke or charcoal. Greatest width of tray, 33 inches. Weight of barrow, 93 pounds. Price, each, 18.50

Greatest height of Nos. 10 and 12 Barrows is 25¼ inches.

No. 12 Barrow is intended for carrying coke, charcoal or other light material, and is not intended for use as a coal barrow.

FIG. 1607.

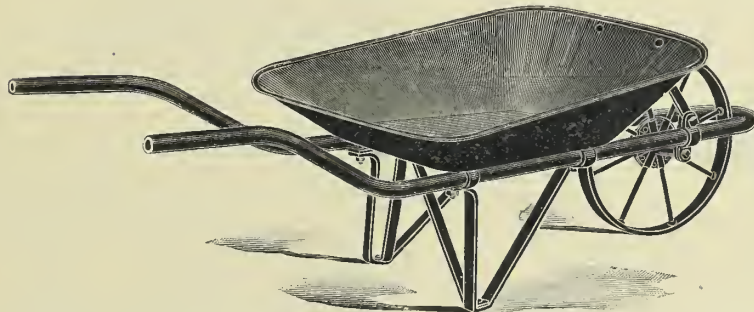


TWO-WHEEL COAL, ORE, OR MINING BARROW.

TUBULAR STEEL WHEELBARROW.

Capacity, 10 cubic feet. Weight, 220 pounds.
 Price, - - - \$38.00

FIG. 1608.



These barrows are intended for moving earth, sand, gravel, mortar, etc.

STEEL MINING AND GENERAL PURPOSE BARROWS.

The No. 15 Lewis Steel Wheels are 16½ inches in diameter, with iron tire 1¾ x ⅜ inches, and steel spoke ½ inch round, and extra heavy, malleable iron hubs.

These barrows have extra heavy leg braces, are intended for hard usage, and are the best general purpose, all metal barrows manufactured.

No. 6. Tray made of No. 14 steel. Size of tray, same as No. 4 dirt barrow. Weight of barrow, 83 pounds. Price, each, \$12.25

No. 7. Tray made of No. 14 steel. Size of tray, same as No. 5 dirt barrow. Also suitable for small coal barrow. Weight of barrow, 88 pounds. Price, each, 14.25

STEEL DIRT BARROWS.

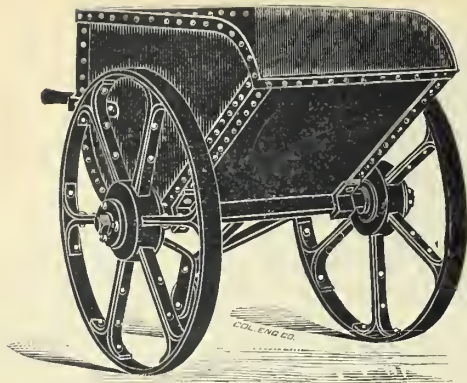
The No. 14 Lewis Steel Wheels are 16½ inches in diameter, with iron tire 1½ x ⅜ inches, and steel spokes ½ inch round.

No. 4. Tray made of No. 15 steel. Capacity, 3 cubic feet of earth. Suitable for light work, such as carrying loose earth, sand, etc. Weight of barrow, 70 pounds. Price, each, \$10.75

No. 4½. Tray made of No. 14 steel. Capacity, 3 cubic feet of earth. Weight of barrow, 75 pounds. Price, each, 11.50

No. 5. Tray made of No. 14 steel. Capacity, 4 cubic feet of earth. Weight of barrow, 78 pounds. Price, each, 13.50

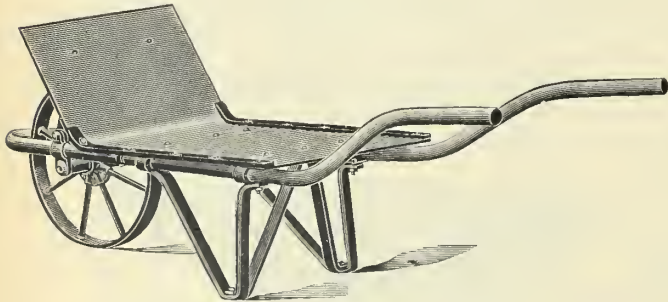
FIG. 1609.

**STANDARD STEEL CHARGING BARROW No. 1.**

Capacity, 10 cubic feet; 1,500 lbs. iron ore; 500 lbs. coal. Weight of barrow complete, 630 lbs.

Anti-friction steel roller bearing. Needs no oil. Stock barrow for blast furnaces and gas works; also for coal docks, boiler rooms, etc.

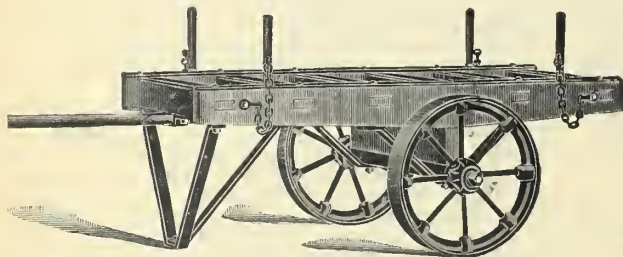
FIG. 1611.

**PIG METAL BARROW No. 13.**

For wheeling pig metal, etc.

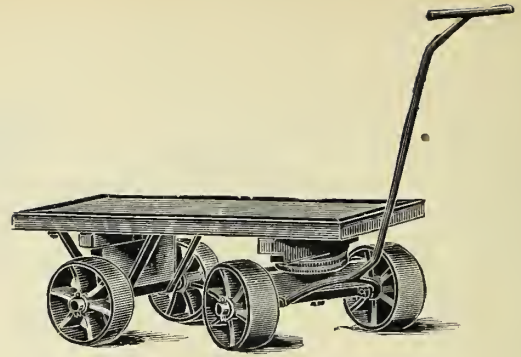
Bottom made of $\frac{1}{4}$ inch steel, 22 inches wide at handles by 25 inches long. Dash, 20 inches wide at top and 14 inches high. Side straps, $\frac{3}{8} \times 1\frac{3}{8}$ inch iron. Lewis Patent Wheels, 16 $\frac{1}{2}$ inches diameter; tire, $1\frac{3}{4} \times \frac{3}{8}$ inches; steel spokes $\frac{1}{2}$ inch round. Weight of barrow, 110 lbs. Price, each, \$18.00.

FIG. 1613.

**BAR IRON TRUCK.**

Platform 25 $\frac{1}{2}$ inches wide by 63 inches long. Iron handle extends 59 inches in front of platform. Truck stands on platform scale 3 feet square. With wrought staggered spoke wheels 2 x 20 inches, with extra 3 inch wrought iron tire. Weight, 350 lbs. Price, \$5.00.

FIG. 1610.

**METAL TRUCK.**

Platform, 42 inches long, 20 inches wide, $1\frac{3}{4}$ inches thick, with heavy iron band around top and countersunk, as shown in cut. All bolts countersunk. Extra heavy wheels, 9 $\frac{3}{4}$ by 4 inches. Wrought iron fifth wheel, 7 $\frac{1}{2}$ inches in diameter. Iron handle, 36 inches long. Well braced. Weight, 235 lbs. Price, \$30.00.

FIG. 1612.

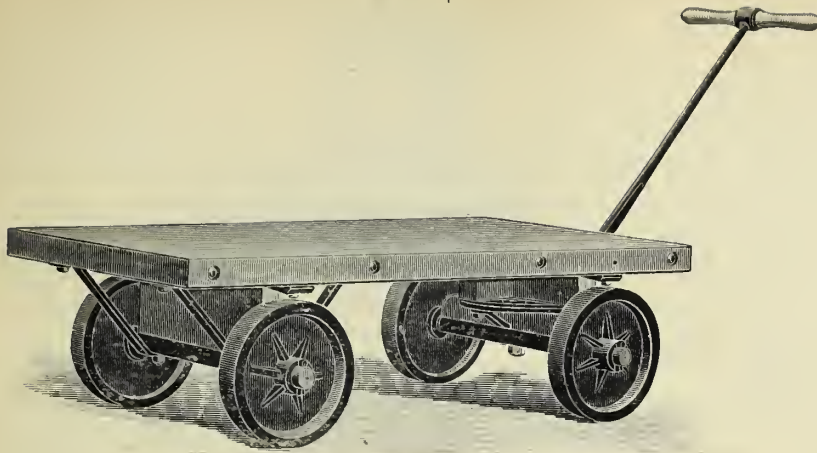
**NEW YORK PATTERN TRUCKS.**

No.	Length of Handles. Ft. In.	Width at Nose. Inches.	Width at Upper Bar. Inches.	Diam. of Wheel. Inches.	Price.
0	3 6 $\frac{1}{2}$	12	18	6	\$4 50
1	4 1	13	18 $\frac{1}{2}$	6	4 85
2	4 5	14 $\frac{1}{4}$	18 $\frac{1}{2}$	7 $\frac{3}{4}$	6 00
3	4 8	15 $\frac{1}{4}$	21 $\frac{1}{4}$	8 $\frac{3}{4}$	7 00
4	5 0	15 $\frac{3}{4}$	21 $\frac{1}{4}$	10	8 00
5	5 4	17 $\frac{1}{4}$	22	12	9 50

No.	Strapped Up.	Full Ironed.	With Rubbered Wheels.
0	\$5 75	\$6 75	\$10 25
1	6 50	7 00	11 00
2	8 00	9 50	14 00
3	9 00	10 00	16 00
4	10 00	11 00	18 00
5	11 50	12 75	23 50

The cut represents the truck plain. By strapped up, we mean the iron carried up to the upper crossbars on arms. By full ironed, we mean crossbars and arms plated with iron. The rubbered wheel trucks are made plain, as shown in cut.

FIG. 1614.

**SHEET METAL TRUCK.**

Axles bored. Wheels turned.

Platform, 30 inches wide by 78 inches long by 20½ inches high. Wheels, 13¾ inches diameter, 2½ inch tread. Front axle, 1¾ inch square. Rear axle, 1½ inch round. Now made with cast iron fifth wheel. Iron handle, 7⁄8 inch round, by 42 inches long, with hounds and brace. Weight, 350 pounds. Price, \$40 00.

COAL TRUCK.

Capacity, half ton.

Box, length at bottom, 4 feet; over all, 5 feet; width at bottom, 21 feet; at top, 2½ feet; depth inside, 2 feet. All of 1½ oak.

Four iron straps (1¾ x ½) entire length on bottom, fastened by screws, extending up and bent over at both ends, and four inside braces (1 x ¼) bolted through sides and bottom. Iron strapped (1½ x ½) all round top edge.

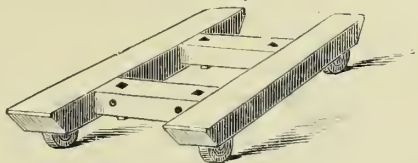
Handles, ¾ inch round iron, bolted on. All bolts inside box are countersunk.

Wheels, 11¾ inches in diameter; 2 inch face. Castor wheels, 6 x 1¾ inches. Iron axle, 1¾ inches square.

Box painted brown outside, unpainted inside. Iron parts blacked. Weight, 325 lbs.

Price, - - - - - \$35 00

FIG. 1617.



Nos. 1 and 2 Trucks.

BOX TRUCKS.

A low truck, strong and well made, for handling large boxes or bales. Sharp cone-head bolts to prevent package from slipping. Axles turned and wheels bored.

6-WHEEL BOX TRUCKS.

Balanced on center wheels, which are set lower than end wheels, so that truck turns easily in any direction without injuring floor. Wood bolsters between frame and axles. Axles turned and wheels bored.

No.	Width, Inches.	Length, Inches.	Wheels, Inches.	Price.	Rubbered Wheels.
1,	18	18	4 x 1¾	\$5 00	\$12 50
2,	18	26	4 x 1¾	6 00	14 00
6-wheel,	18	24	3¾ x 1¾	8 00	17 50

MACHINE SHOP WAGON.

Capacity, 4 tons.

Bed, 6 feet long by 3 feet wide by 21 inches high from floor to top.

Heavy cast iron wheels, 16 inches in diameter, 3 inches tread, and extra heavy cast rims.

Steel axles, 2 inches square.

Steel fifth wheel, 15 inches in diameter, well braced.

Weight, 800 pounds.

Price, - - - \$60 00

FIG. 1615.

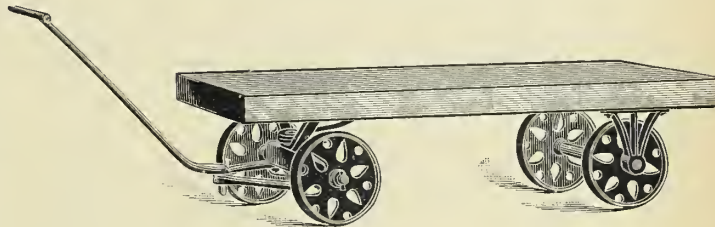
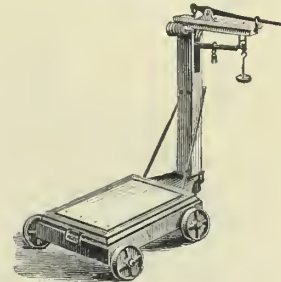


FIG. 1616.

**PORTABLE PLATFORM DROP LEVER SCALES.**

With heavy wheels and notched beam.

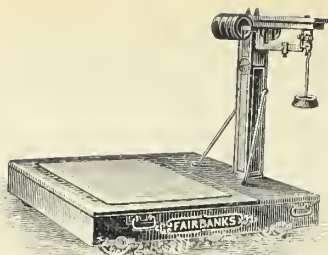
New No.	Capacity. Lbs.	Platform. In.	Price.
1166	2500 x ½	26 x 34	\$94.00
1168	2000 x ½	25 x 33	82.00
1170	1500 x ½	21 x 28	70.00
1172	1200 x ½	20 x 28	59.00
1174	1000 x ½	17 x 26	51.00
1176	800 x ½	17 x 26	46.00
1178	600 x ¼	16 x 25	41.00
1180	400 x ¼	15 x 21	34.00

PORTABLE PLATFORM SCALES.

Without wheels.

New No.	Capacity. Lbs.	Platform. In.	Price.
1100	2500 x ½	26 x 34	\$80.00
1102	2000 x ½	25 x 33	70.00
1104	1500 x ½	21 x 28	52.00
1106	1200 x ½	20 x 28	45.00
1108	1000 x ½	17 x 26	39.00
1110	800 x ½	17 x 26	34.00
1112	600 x ¼	16 x 25	30.00
1114	400 x ¼	15 x 21	23.00

FIG. 1618.



PORTABLE WAREHOUSE SCALES.

These scales are furnished with a very large platform, and the wheels are placed underneath out of the way. They are adapted for general warehouse use where a large portable scale is required. Nos. 1004 and 1010 have the pillar on the long side of the scale.

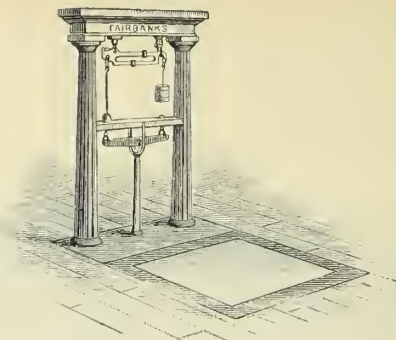
WITHOUT WHEELS.

New No.	Capacity. Pounds.	Platform. Inches.	Price.
1000	5000 x 1/2	48 x 48	\$170.00
1002	3500 x 1/2	42 x 44	110.00
1004	2500 x 1/2	46 x 37	95.00

WITH WHEELS.

1006	5000 x 1/2	48 x 48	185.00
1008	3500 x 1/2	42 x 44	125.00
1010	2500 x 1/2	46 x 37	105.00

FIG. 1619



DORMANT WAREHOUSE SCALES.

WITH TWO IRON PILLARS AND DOUBLE BEAM.

The Double Beam shown on these Scales is very convenient whenever the tare of trucks or cases is to be taken.

If desired, this pattern of Scale will be furnished with a compound beam, giving the entire capacity without loose weights, at the price given on preceding page.

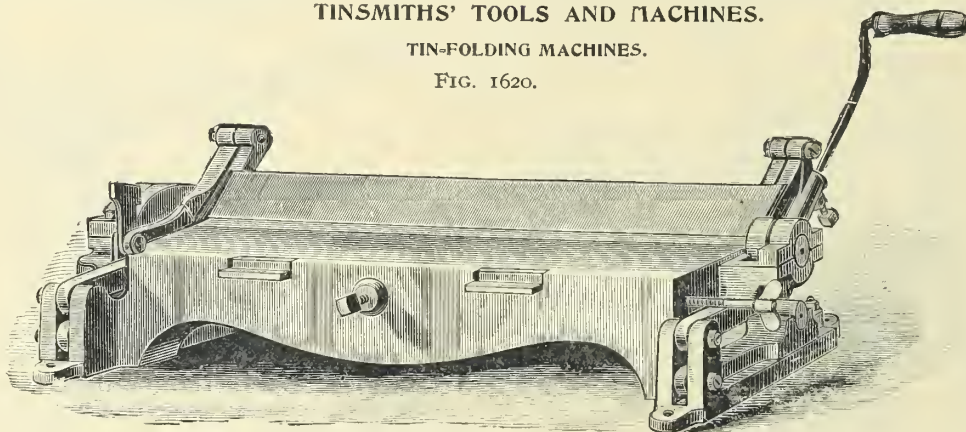
New No.	Capacity Pounds.	Platform Inches.	Platform to Pillars.	Price
1046 D.	5,000 x 1/2	48 x 48	23 inches.	\$180 00
1048 D.	3,500 x 1/2	42 x 44	13 "	133 00
1050 D.	2,500 x 1/2	46 x 37	12 "	113 00
1052 D.	3,500 x 1/2	42 x 44	20 "	143 00

With extra long neck, - - - }

TINSMITHS' TOOLS AND MACHINES.

TIN-FOLDING MACHINES.

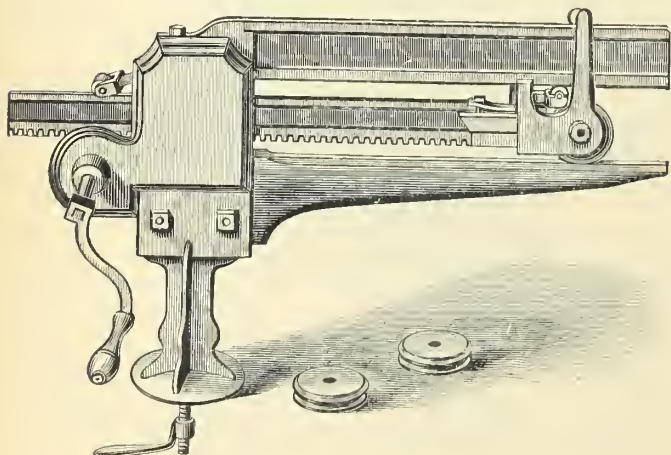
FIG. 1620.



PATENT ADJUSTABLE-BAR FOLDER.

Will turn locks from 3-32 to 1 inch in width.

FIG. 1621.



BRASS MOUNTED GROOVER.

PATENT ADJUSTABLE-BAR FOLDER.

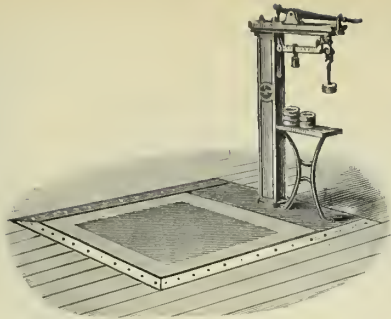
No. 50.	17 inches, for tin, will turn locks from 3-32 to 1/2 inch,	\$25 00
" 52.	20 inches, will turn locks from 3-32 to 1 inch,	30 00
" 54.	30 inches, will turn locks from 1-32 to 1 inch,	40 00
" 56.	42 inches, will turn close locks only from 3-16 to 1 5/8 inch,	80 00
" 58.	42 inches, will turn close or open locks from 3-16 to 1 5/8 inch,	90 00

We are also making special Folders for forming any width locks, on light or heavy plate, of any length desired.

BRASS MOUNTED GROOVER.

No. 1.	For heavy work, 20 inches, with stand.	\$13 50
" 2.	For common work, 17 inches, with stand,	11 00
Extra stands for either No. 1 or No. 2,	-	each, 75
Extra rollers (three rollers constitute a set),	-	" 75
Groover ratchet, with brass mounting,	-	" 3 25
Groover ratchet, without brass mounting,	-	" 2 25

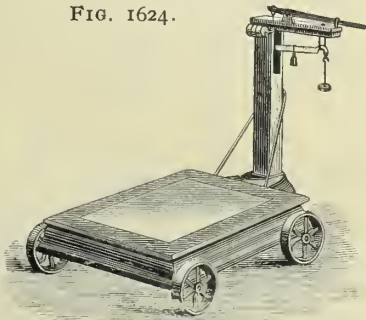
FIG. 1622.

**DORMANT WAREHOUSE SCALES.**

WITH SINGLE WOOD PILLAR, DROP LEVER AND NOTCHED

New No.	Capacity. Pounds.	BEAM. Platform. Inches.	Platform to Pillar.	Price.
1026	5000 x 1/2	48 x 48	24 inches	\$150.00
1028	3500 x 1/2	42 x 44	13 "	105.00
1030	2500 x 1/2	46 x 37	12 1/2 "	92.00
1032	2000 x 1/2	25 x 34	10 "	78.00
1034	1500 x 1/2	21 x 31	4 "	68.00

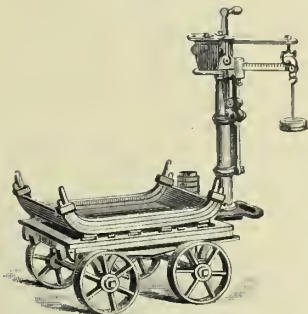
FIG. 1624.

**PORTABLE FOUNDRY SCALES.**

Extra heavy, with 12 inch wheels and drop lever. Notched beam.

New No.	Capacity. Lbs.	Platform. In.	Price.
1164	3000 x 1/2	31 x 40	\$125.00
WITHOUT DROP LEVER.			
1208	3000 x 1/2	31 x 40	\$125.00

FIG. 1626.

**PIG IRON SCALES.**

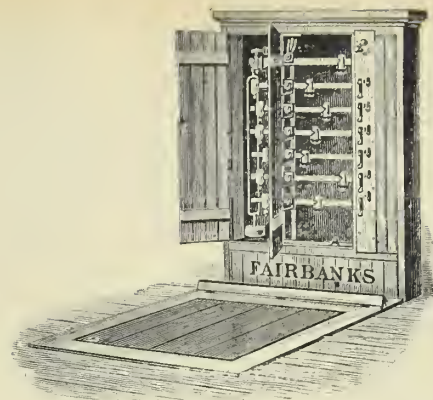
WITH DROP LEVER AND BRASS SLIDING POISE.

This scale is made very heavy and constructed entirely of metal, so that it is most suitable for foundry use. It is also furnished with a special pattern drop lever, which is convenient for relieving the bearings of the scale when not in actual use.

WITH WHEELS.

No.	Capacity. Pounds.	Platform. Inches.	Price.
1412	2500 x 1	23 x 37	\$110.00
1414	3000 x 1	23 x 37	120.00

FIG. 1623.

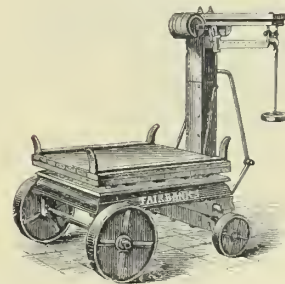
**FURNACE STOCK CHARGING SCALES.**

WITH IMPROVED BEAM AND PATENT POISE FASTENING.

The frame and platform are made of iron, and the latter is furnished with an inverted V-shaped flange, which serves as a guard for the wheels and keeps dirt from entering the scale.

No.	Beams.	Platform, Inches.	Price.
1641, - - - - -	4	48 x 48	\$260 00
1643, - - - - -	5	48 x 48	270 00
1645, - - - - -	6	48 x 48	280 00
1647, - - - - -	7	48 x 48	290 00
1649, - - - - -	8	48 x 48	300 00
1651, - - - - -	4	42 x 44	230 00
1653, - - - - -	5	42 x 44	240 00
1655, - - - - -	6	42 x 44	250 00
1657, - - - - -	7	42 x 44	260 00
1659, - - - - -	8	42 x 44	270 00

FIG. 1625.

**ROLLING MILL OR IRON SCALES.**

With rubber spring platform rack.

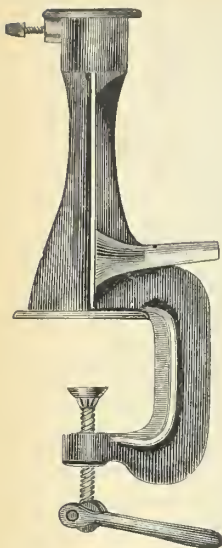
WITH SLIDING POISE.

No.	Capacity. Lbs.	Platform. In.	Price.
1416	2500 x 1/2	23 x 31	\$125.00
1418	4000 x 1/2	31 x 40	160.00
1420	6000 x 1/2	31 x 40	185.00
1422	8000 x 1	31 x 40	210.00
1424	10000 x 1	31 x 40	225.00
1426	12000 x 1	31 x 40	240.00

WITH DROP LEVER AND NOTCHED BEAM.

1428	2500 x 1/2	23 x 31	\$125.00
1430	4000 x 1/2	31 x 40	160.00
1432	6000 x 1/2	31 x 40	185.00
1434	8000 x 1	31 x 40	210.00
1436	10000 x 1	31 x 40	225.00
1438	12000 x 1	31 x 40	240.00

FIG. 1627.



IMPROVED MACHINE STANDARDS.

Encased machines are all packed with these standards. These standards are so made as to be used on any bench, varying in thickness from 1 to 3 1/2 inches. The necessity of cutting holes in the benches is obviated, and the tinner is enabled to use a machine in any part of his shop most convenient to his work. The wrench is always attached to the standard.

These standard machines are also adapted to Raymond's No. 1 and Columbian machines.

Improved machine standards, - - - - - \$1.00

A full set of encased machines is made up as follows:

Adjustable bar Folder, No. 52, 20 inches,	-	-	-	-	\$30.00
Encased grooving machine, No. 1, 20 inches, with standard,	-	-	-	-	13.50
Encased wiring machine, with standard,	-	-	-	-	14.00
Encased setting down machine, with standard,	-	-	-	-	9.75
Encased large turning machine, with standard,	-	-	-	-	11.50
Encased small turning machine, with standard,	-	-	-	-	11.25
Encased large burring machine, with standard,	-	-	-	-	10.50
Encased small burring machine, with standard,	-	-	-	-	10.00

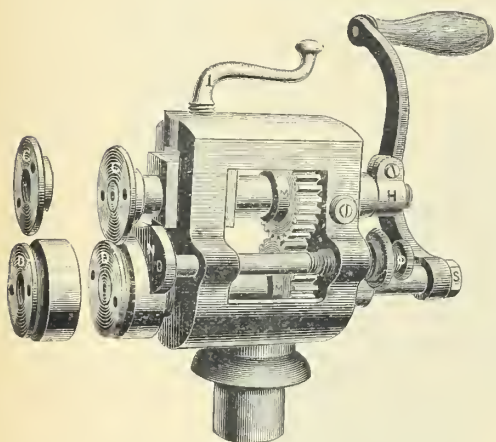
Full set of encased machines, with standards, - - - - - \$110.50

Full set of encased machines, without standards, - - - - - 106.00

Full set of encased machines, without folder and groover, - - - - - 67.00

LARGE TURNING MACHINES.

FIG. 1629.



The parts lettered in these cuts are the same as the encased machines, and the same price.

Large turning machine, with extra upper and lower face, with standard, - - - - - \$10.75

Large turning machine, with extra upper and lower face, without standard, - - - - - 10.00

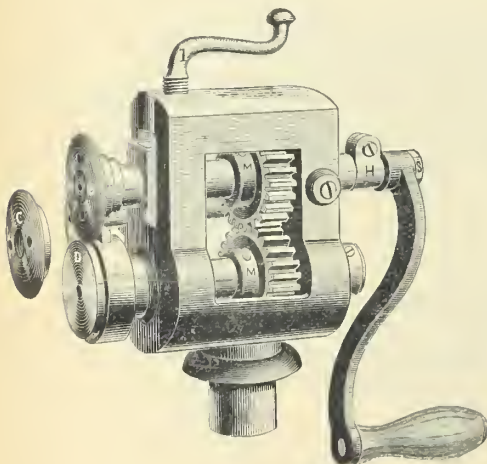
Small turning machine, with extra upper and lower face, with standard, - - - - - 10.50

Small turning machine, with extra upper and lower face, without standard, - - - - - 9.75

Scale, 1 to 4.

LARGE BURRING MACHINE.

FIG. 1631.



The parts lettered in these cuts are the same as the encased machines, and the same price.

Large burr, with extra upper face, with standard, - - - - - \$10.00

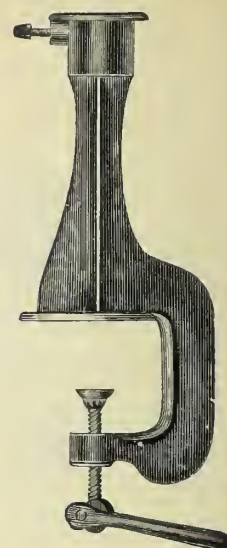
Large burr, with extra upper face, without standard, - - - - - 9.25

Small burr, with extra upper face, with standard, - - - - - 9.50

Small burr, with extra upper face, without standard, - - - - - 8.75

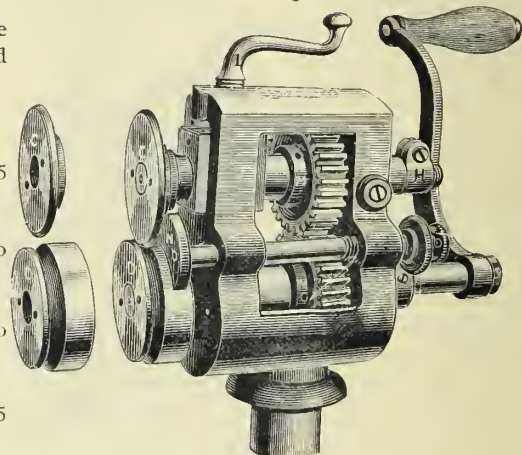
Scale, 1 to 4.

FIG. 1628.



SMALL TURNING MACHINES.

FIG. 1630.



SMALL BURRING MACHINE.

FIG. 1632.

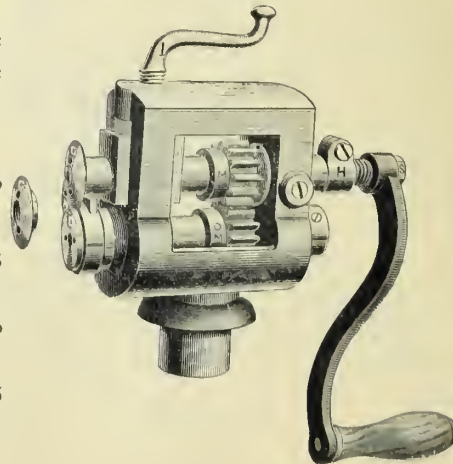
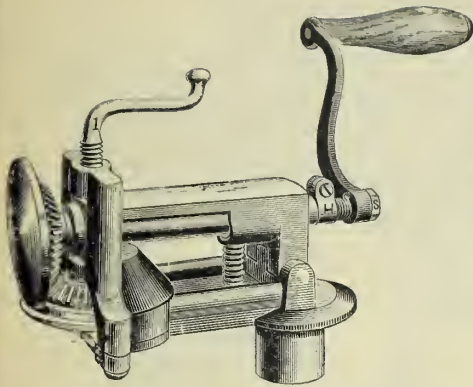


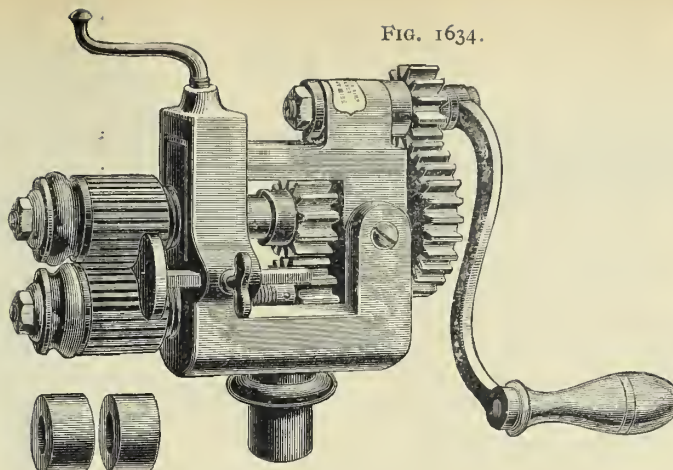
FIG. 1633.



SETTING DOWN MACHINE.

Setting Down Machine, with Standard, \$9.75
 Setting Down Machine, without Standard, 9.00

FIG. 1634.



Crimping Machine.

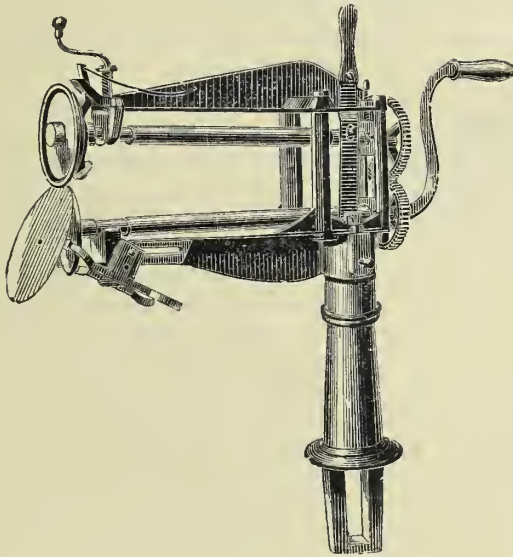
COMBINED STOVE PIPE CRIMPER AND BEADER.

No. 7. Stove Pipe Crimper and Beader complete, with Standard, - - - - -

\$12.00

Patent Standard.
 Used with Crimping Machine.

FIG. 1635.

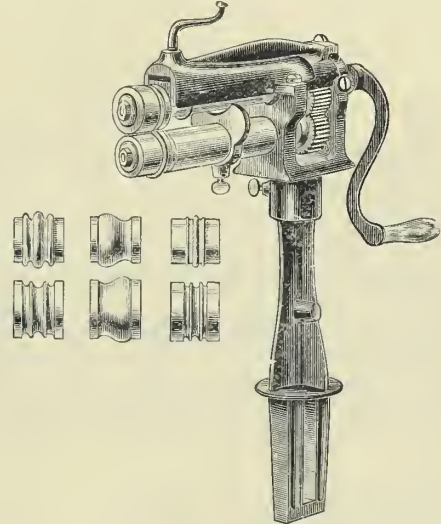


DOUBLE SEAMING MACHINES.

Moore's Patent Double Seaming Machine, with Standard.

No. 1. Moore's patent, 15 inches, for heavy metal, 4 inch face, with Standard, - - -	\$21.00
No. 2. Moore's patent, 13 inches, for common work, 4 inch face, with Standard, - - -	19.00
No. 3. Moore's patent, 10 inches, for coffee pots, 3 inch face, with Standard, - - -	16.00
Extra faces, for Moore's Double Seamer, each, -	2.50
Extra top plate, for Moore's Double Seamer, No. 2, -	1.50
Frame for Moore's Double Seamer, No. 2, - -	2.50
Frame for Moore's Double Seamer, No. 3, - -	2.00
Extra stands, for either Nos. 1, 2, or 3, each, -	1.00
Thin steel wheel for Moore's Double Seamer, each, -	75

FIG. 1636.



PATENT BEADING MACHINES.

No. 4 BEADING MACHINE, WITH STAND.

With Adjustable Boxes and Duplicate Parts.

These Beading Machines are made in the same manner as the Encased Machines. All the parts are made to standard gauges and are lettered, so that any piece can be replaced by designating the number of the Beader and the letter stamped upon the part wanted.

The four pairs of rollers accompanying the No. 4 Beader are the Single Bead, O. G. Bead, Triple and Triple Coffee Pot, as represented in the above cut.

No. 4. Patent 6 inch, with four pairs rollers and rotary stand, - \$19.75
 Size of Beads as follows: O. G., $\frac{3}{4}$ inch; Triple, $\frac{5}{8}$ inch; Triple Coffee Pot, $\frac{1}{2}$ inch; Single, 3-16 inch.

No. 5. Patent 4 inch; for tin, with five pairs rollers and rotary stand, \$16.75

Size of Beads as follows: Astral, $\frac{5}{8}$ inch; O. G., $\frac{7}{8}$ inch; Triple Coffee Pot, 5-16 inch; Triple Coffee Pot, fine, $\frac{3}{8}$ inch; Single Bead, $\frac{1}{8}$ inch.

Extra wrought iron rollers for No. 4, - - - per pair, \$2.00

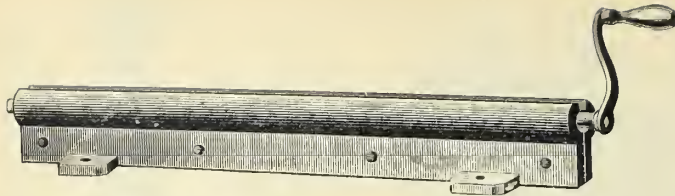
Extra wrought iron rollers for No. 5, - - - " 1.25

Extra stands for Nos. 4 and 5 Beaders, - - - each, 75

Gauge for No. 4 Beader, - - - - - 75

Cap and crank screw for No. 4 Beader, - - - - - 2.00

FIG. 1637.

**GUTTER MACHINES.**

IRON BOTTOM GUTTER BEADER, WITH ENCLOSED ROD.

No. A2.	Iron bottom, with enclosed rod, 96 inches,	- -	\$30 00
" A1.	Iron bottom, with enclosed rod, 60 inches,	- -	20 00
" O1.	Iron bottom, with enclosed rod, 42 inches,	- -	9 00
" O2.	Iron bottom, with enclosed rod, 30 inches,	- -	6 00
" I1.	Iron bottom, with enclosed rod, 20 inches,	- -	4 00
" I2.	Iron bottom, with enclosed rod, 15 inches,	- -	3 50

In ordering the above Gutter Beaders be sure and specify the diameter of rod wanted.

FIG. 1638.

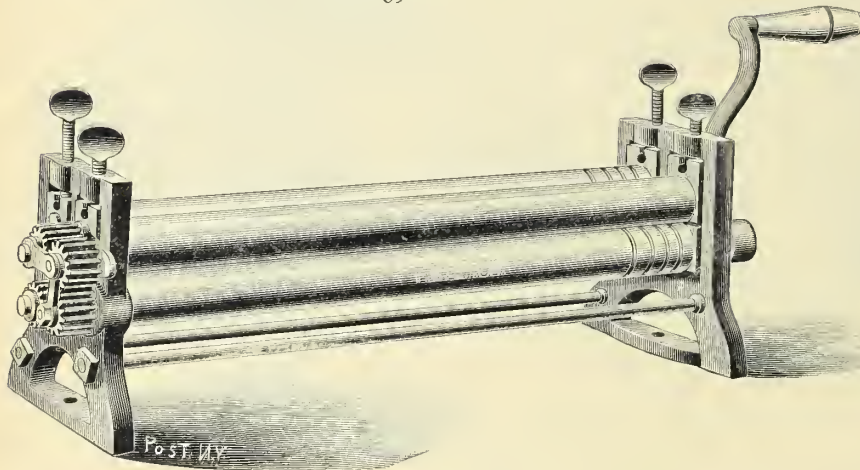
**IMPROVED SQUARING SHEARS FOR CUTTING SHEET METAL.**

No. 120.	Will cut tin, 22 inches long,	-	\$38 00
" 125.	Will cut tin, 25 inches long,	-	48 00
" 130.	Will cut No. 18 iron, 30 inches long,	- -	54 00
" 140.	Will cut No. 18 iron, 42 inches long,	- -	155 00

FORMING MACHINES.

No. 11.	Patent Stove Pipe Former, 1 3/4 inch rolls, 30 inches long,	-	\$20 00
" 12.	Patent Stove Pipe Former, 2 inch rolls, 30 inches long,	-	22 00
" 13.	Patent Stove Pipe Former, 2 inch rolls, 37 inches long,	-	27 00
" 21.	Patent Tin Pipe Former, 1 1/2 inch rolls, 16 inches long,	-	11 00
" 22.	Patent Tin Pipe Former, 1 1/2 inch rolls, 20 inches long,	-	12 00

FIG. 1639.

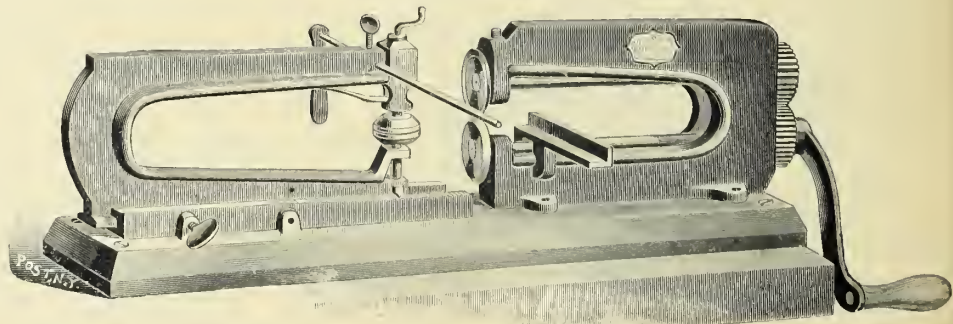


PATENT FORMER, WITH COMPENSATING GEAR.

ROTARY SHEARS.

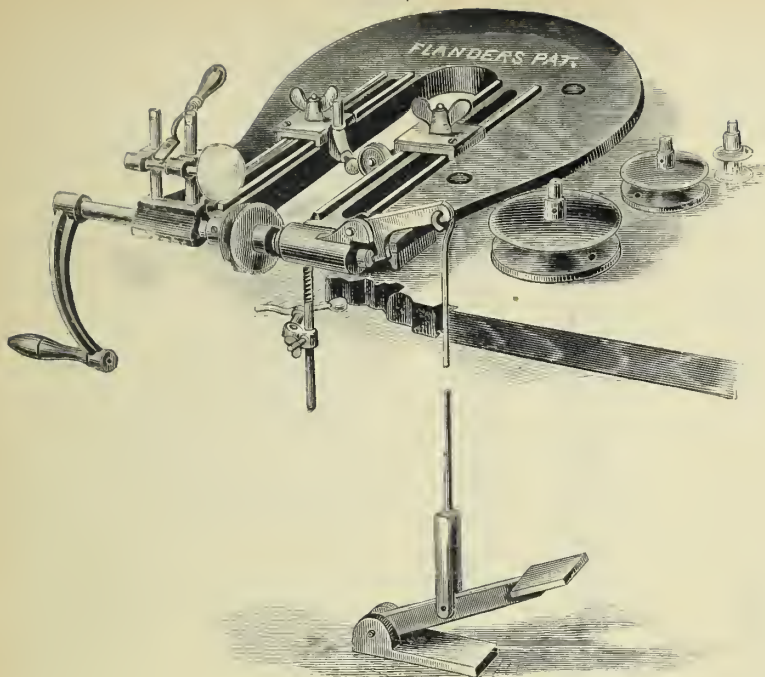
No. 1.	Cuts 14-inch circles,	-	\$33 00
" 1.	With squaring attachment, weight, 70 pounds,	- -	43 00
" 2.	Cuts 20 inch circles,	-	38 00
" 2.	With squaring attachment, weight, 80 pounds,	- -	48 00
" 3.	For both hand and power, will cut 40-inch circles, weight, 225 pounds,	- -	75 00
	No. 3 will cut circles as small as 5 inches.		
" 4.	For both hand and power, will cut circles from 5 to 48 inches from No. 16 iron. It has a 12-inch throat, with slitting gauge to go in place of disc head; back geared; weight, 500 pounds,	- - -	175 00

FIG. 1640.



PATENT BEVEL, SQUARE AND CIRCULAR SHEARS.

FIG. 1641.



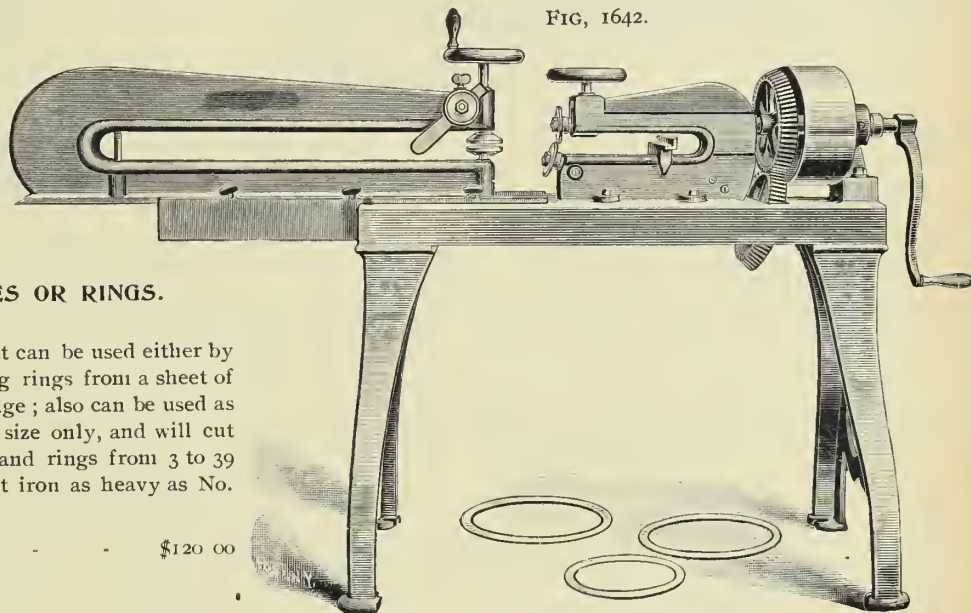
FLANDER'S PATENT CIRCULAR SHEARS.

With four pairs of discs—one pair each of $1\frac{7}{8}$, 3, $4\frac{7}{8}$, and $7\frac{5}{8}$ inches in diameter.

No. 0 will cut circles from 4 to 30 inches in diameter.
No. 1 will cut circles from $2\frac{1}{2}$ to 23 inches in diameter.

No. 0, operated by steam or hand power, for gas meters, &c., with one pair $10\frac{1}{4}$ inch discs and one pair cutters on iron frame, - -	\$150 00
No. 1, operated by hand, for tin, &c., with four pairs discs, one pair cutters, and edge turner, - - - - -	30 00
No. 1, without edge turner, - - - - -	25 00
Extra discs for No. 0, not over 15 inches in diameter, per pair, - - - - -	9 00
Extra discs for No. 1, not over 8 inches in diameter, per pair, - - - - -	1 50
Extra cutters for No. 0, - - - - - per pair, - - - - -	3 50
Extra cutters for No. 1, - - - - - per pair, - - - - -	1 50
Extra cutter stocks for No. 1, - - - - - per pair, - - - - -	2 50
Extra edge turner, - - - - -	5 00

FIG. 1642.



SHEAR FOR CUTTING CIRCLES OR RINGS.

This machine is constructed so that it can be used either by hand or power. It is designed for cutting rings from a sheet of metal without cutting through the outer edge; also can be used as a regular circular shear. It is made in one size only, and will cut circles from 3 to 40 inches in diameter, and rings from 3 to 39 inches in diameter. It can be used on sheet iron as heavy as No. 16. Weight, 400 pounds.

No. 20, Ring and Circular Shear, - - - - - \$120 00

TINNERS' BENCH SHEARS.

FIG. 1643.



No. 00, Bench, cut 12 inches, - - -	each, \$13 50
" 0, " " $10\frac{1}{2}$ " - - -	" 12 00
" 1, " " 9 " - - -	" 8 00
" 2, " " $8\frac{3}{8}$ " - - -	" 7 00
" 3, " " $8\frac{3}{8}$ " - - -	" 6 00
" 4, " " 8 " - - -	" 5 00
" 5, " " 7 " - - -	" 4 00
" 6, " " 6 " - - -	" 3 50
Elbow Bench, - - - - -	" 5 25
Elbow Bench, extra heavy, cut 6 inches, - - -	" 12 00

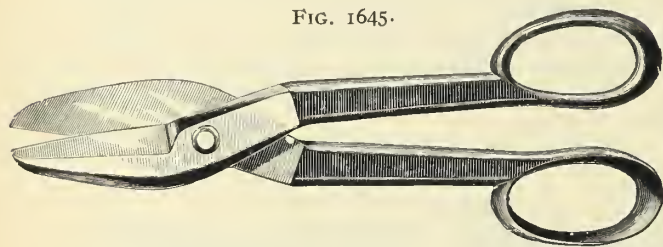
Elbow Bench, double extra heavy, cut $7\frac{1}{2}$ inches, extreme length, 46 inches, and will cut No. 12 iron, - - - 25 00

TINNERS' STAKES.

CAST IRON, WROUGHT IRON AND STEEL.

No. 1.	Large stake, or beakhorn, 45 pounds,	- - -	\$15 00
" 2.	Large stake, or beakhorn, 40 pounds,	- - -	13 25
" 4.	Large stake, or beakhorn, 30 pounds,	- - -	10 00
" 1.	Double seaming, large end 17 in., small end 12 in.,	- - -	9 00
" 1.	Double seaming, each end 11 inches,	- - -	8 00
" 0.	Conductor, each end 14 inches,	- - -	6 00
" 1.	Bevel edged square, face 3x5 inches,	- - -	6 00
" 2.	Bevel edged square, face 2½x4½ inches,	- - -	5 00
Hollow mandrel,	3 feet 4 inches entire length,	- - -	5 50
Extra hollow mandrel,	4 feet entire length, round part 11¾ inches diameter, flat part 15 inches wide, weight 300 pounds,	- - -	25.00
Common blowhorn,	large end 9 inches, small end 17½ inches,	- - -	5.00
Creasing, with horn,	round end 9½ inches, flat end 6½ inches,	- - -	4.50
Common creasing,	14½ inches long,	- - -	4.00
Coppersmith's square,	2½ x 4½ inches,	- - -	3.50
Common square,	face 2½ x 4½ inches,	- - -	3.00
Large square,	face 3½ x 5½ inches,	- - -	7.00
Small square,	face 2½ x 1½ inches,	- - -	2.00
Candle mould,	small end 18 inches, horn 8½ inches,	- - -	2.75
Needle case,	flat end 8 inches, small end 10½ inches,	- - -	2.25
Tea kettle, with four steel heads,	- - - - -	- - -	15.75
Steel heads for tea kettle, each,	- - - - -	- - -	1.75

FIG. 1645.



HAND SHEARS OR SNIPS, LEFT HAND.

No. 06½.	Hand, cut 4½ inches, extra heavy, entire length,	- - -	\$4.50
" 6½.	Hand, cut 4½ inches, each,	- - -	3.00
" 7.	Hand, cut 4 inches, each,	- - -	2.50
" 8.	Hand, cut 3½ inches, each,	- - -	2.00
" 9.	Hand, cut 3 inches, each,	- - -	1.50
" 10.	Hand, cut 2½ inches, each,	- - -	1.40

We can furnish Nos. 8 and 9 snips made for left handed men at an extra cost of fifty cents each, net.

SWEDGES.

Cullender swedge, \$4.75	Square pan swedge, \$5.00
Creasing swedge, \$5.25	

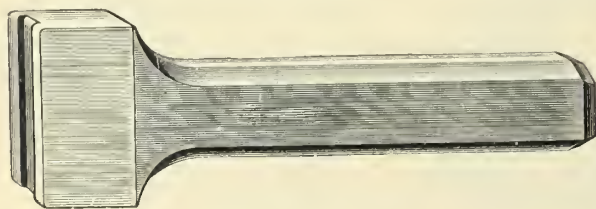
RAISING HAMMERS.

No.	1	2	3	4
Each,	\$2.25	1.75	1.25	.75
Handles, per dozen, extra,	-	-	-	1.25

PLANISHING HAMMER.

Planishing hammer, per pound,	-	-	-	\$1.00
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FIG. 1647.

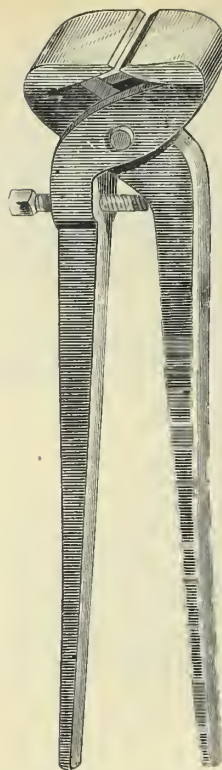


GROOVING TOOLS.

HAND GROOVER.

Nos. 00 and 0	1 and 2	3 and 4	5 and 6	7 and 8	Cast steel extra
Each, 75	63	50	37	25	cents

FIG. 1644.

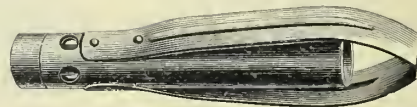


IMPROVED CUTTING NIPPERS.

The jaws of these nippers are made from best cast steel.

No.	Each.
0. Very large and strong, 2 inch jaws, 14 inches long,	- - - \$3.75
1. Extra large size, 12 inches long,	2.25
2. Large size, 11 inches long,	2.00
3. Common size, 10 inches,	1.50
4. Small size, 9 inches,	1.40
5. Small size, 8 inches,	1.00

FIG. 1646.



GAS HEATER.

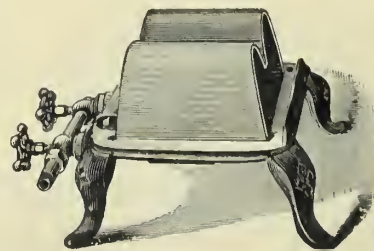
FOR TEMPERING DRILLS, PUNCHES, CHISELS, SMALL TOOLS &C.

This Gas Heater produces a colorless flame free from smoke and is a substitute for a forge in heating small tools to be hardened or tempered. A piece of steel one half inch in diameter can be heated sufficiently for hardening in about six minutes.

DIRECTIONS:—Put on a sufficient head of gas to prevent the flame from descending into the tube. For heating larger pieces, the flame should be nearly three inches wide. The upper ends of the curved side pieces should not be more than one-quarter of an inch apart. The articles to be heated should be held in the upper part of the flame, above the central blue part and parallel with it. The larger the piece to be heated the further it should extend into the flame. The heater should be located in a dark place, and supports may be provided for greater convenience in heating heavy articles.

Price, - 75 cents.

FIG. 1648.

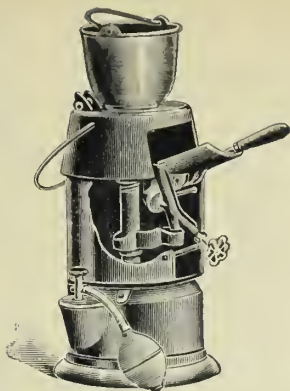


GAS SOLDERING FURNACE.

The Gas Soldering Furnace is rapidly coming into general use on account of its convenience and cleanliness. Fitted with two powerful burners.

Price, - - - - - \$5 00

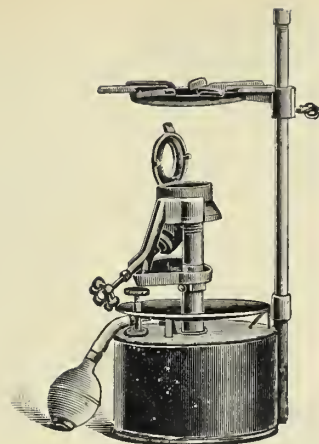
FIG. 1649.

**GASOLINE SOLDERING FURNACE.**

This combined "Tinner's and Plumber's Furnace" is the most powerful, economical and convenient furnace ever manufactured, and is made of the heaviest and best material. The new burner with which they are fitted will heat a 6 pound copper in less than four minutes, and melt 10 pounds solder in eight minutes, and the burner being almost noiseless, removes the serious objection heretofore existing against furnaces and fire pots.

Price, - - - - - \$9 00

FIG. 1650.

**GASOLINE LABORATORY LAMP.**

Our Laboratory Lamp, after a severe test, secured the endorsement of the "American Analyst," which is a sufficient guarantee of the merits of this powerful heater. With ordinary pressure a temperature of 1110° F. can be obtained, and much higher if desired. The reservoir is filled two thirds full of gasoline, being about three pints. The brass valve is then opened and air forced into the reservoir by squeezing the rubber bulb until sufficient pressure is obtained, when the brass valve is shut tight and the burner valve opened, and allowing the cup to become nearly full, when the valve is shut off and the fluid ignited. When nearly burnt out, open the valve again and light at cone, and you will have an intense vapor fire. Is largely used by druggists, laboratories and analysts.

Price, - - - - - \$5 00

FIG. 1651.

**"WELLS LIGHT."**

No. 1. 800 candle power. Flame, 15 inches long; oil used, $\frac{1}{2}$ gallon per hour. Size of tank, $10\frac{1}{2} \times 16$ inches. Weight when full, 75 pounds. When empty, 45 pounds.

This size is designed for extreme portability, has a single handle on the top, and can be carried easily by a boy.

It holds sufficient oil to burn for about 5 hours, but can be refilled while burning—without danger, or putting out the light.

It is a handy shop light, for foundries, boiler works, machine shops, round houses, etc., and in any work requiring a smaller light than the No. 3, and for repair work generally.

Price, complete, - - - \$75.00

No. 3. 2000 candle power. Flame, 30 inches long; oil used, 1 gallon per hour. Size of tank, 18×24 inches. Weight when full, 245 pounds; when empty, 110 pounds.

This tank is of steel boiler plate (galvanized) with handles on each side.

It holds sufficient oil to burn 14 hours, but may be refilled while burning.

Absolutely free from danger, giving a clear white light without smoke or spray, is not dazzling, and does not throw intense shadows like the electric light.

Price, complete, - - - \$100.00

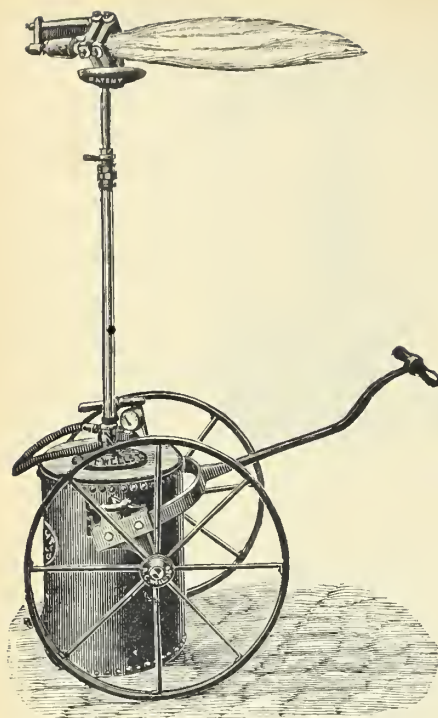
Extra burners for No. 1 light, \$10.00; for No. 3 light, \$12.00.

An extra light is of value where lights are in constant use in tunnels, mines, etc. A spare burner being kept always clean ready for immediate use is always an advantage.

No. 1 burners to work with No. 3 Lights are very useful, as a light of 800 candle power is often sufficient in clearing up foundries and in machine shops, and enables users to have either 800 or 2000 candle power light as desired with a No. 3 Light.

All lamps sent complete with chimney, wind guard, spanners, cleaners and book of instructions.

FIG. 1652.

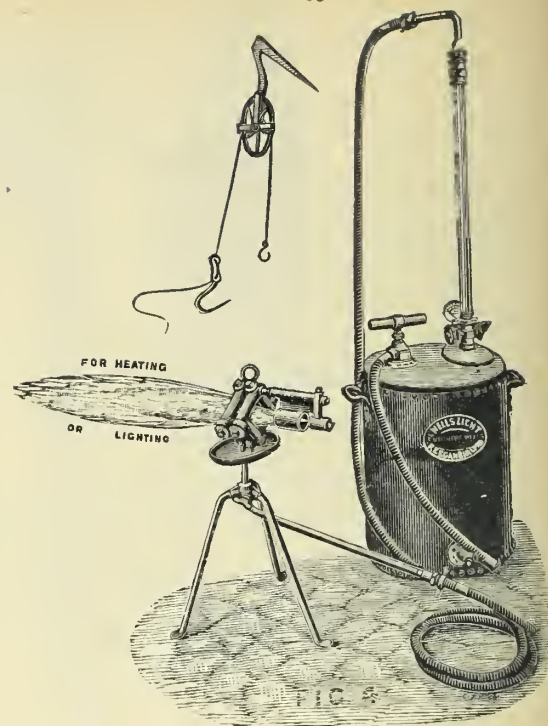
**CARRIAGE FOR No. 3 LIGHT.**

This handy carriage is made to pick up any No. 3 lamp.

By its use, lamps when full of oil can be easily wheeled about by one person.

Price carriage only, to fit any No. 3 lamp, \$18.00

FIG. 1653.

**ARRANGEMENT FOR HEATING OR LIGHTING.**

As an adjunct to our No. 3 light, the arrangement shown will be found very useful for many purposes.

The burner can be swung up to a wooden pole or beam, or lowered below the level of the lamp, and is thus rendered practically independent of the tank.

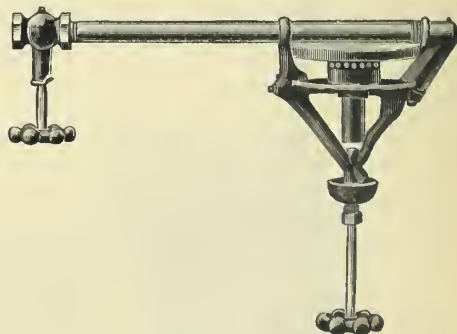
For use in dry docks, for heating quickly, for builders' use, it will be found serviceable, as the burner can stand anywhere on a scaffold, while the tank remains in a secure position.

PRICES.

Tripod burner, with brass gland to drop any size burner in, telescope tail pipe, with 10 feet flexible oil hose and couplings,	\$16.00
Snatch block 4a, with hook and spike, and 20 feet of flexible wire,	5.00

Longer lengths of special oil piping supplied if required.

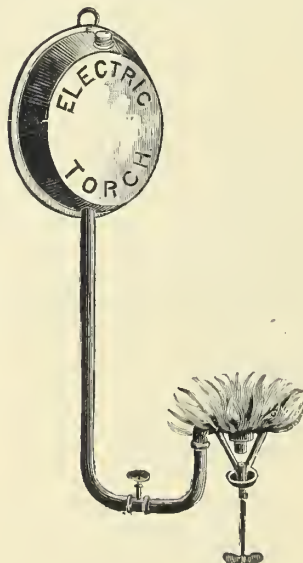
FIG. 1655.

**"JUMBO" GASOLINE TORCH BURNER.**

No. 14, - \$2.00 No. 12, torch, complete, - \$3.00

Our "junbo" torch is the largest and most powerful light that is on the market. Has five times the lighting capacity of the regular torch and at less cost in proportion.

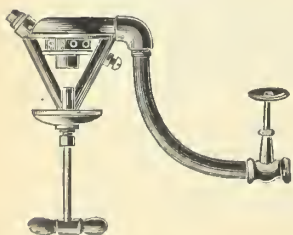
FIG. 1654.

**OIL TORCH.**

Price, \$2.00

Our "electric" oil torches are largely used in foundries, blacksmith shops, mills, machine shops, round houses, tunnels, etc., and principally for indoor use. Light is very brilliant. Burns best water-white oil.

FIG. 1656.

**OIL TORCH BURNER.**

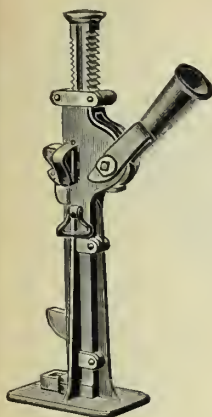
This cut represents the burner that is used on above torch.

Sold separately.

Price, \$1.25

JACKS.

FIG. 1666.



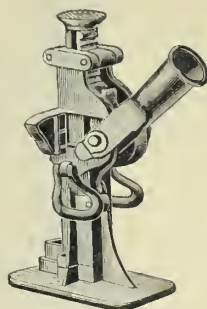
No. 1.

Style.	Height
No. 1	28 inches
No. 2	20½ "
No. 3	22 "
No. 4	32 "

THE "SURE DROP" TRACK JACK.

The only Jack in the market that will trip easily and instantly under all conditions. quickly and easily operated. Perfectly made. Least number of wearing parts.

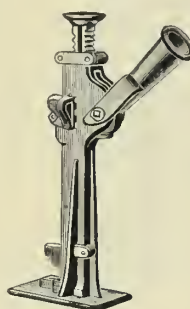
FIG. 1667.



No. 2.

Rise of Bar.
15 inches
10 "
12 "
18 "

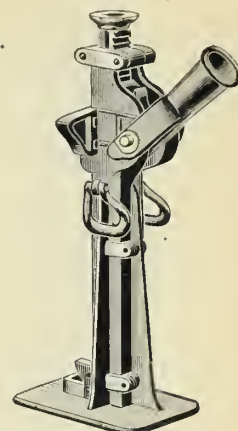
FIG. 1668.



No. 3.

Size of (Steel) Bar.
2 x 1½ inches
2 x 2 "
1¾ x 1¼ "
2 x 2 "

FIG. 1669.



No. 4.

Weight of Jack.	Capacity.	List Price.
78 pounds	10 tons	\$20.00
80 "	15 "	24.00
50 "	5 "	16.00
120 "	15 "	35.00

JACK SCREWS.

Both roller bearing, and ordinary style. If roller bearing Jacks are wanted so specify on orders, otherwise ordinary style will be sent.

Order by numbers and thus avoid errors.

Instead of balls we put in rollers. These rollers will stand any load that the Jack will carry, and are not liable to get out of order. We have thoroughly tested these Roller Jacks with a spring balance and find a saving of 75 per cent. of power needed to lift a given weight.

The price is about 10 per cent. more for Roller Jacks, and the gain is 75 per cent. This ought to insure their sale as fast as the facts become known.

No.	Diam. of Screw Inches.	Height of Barrel Inches.	Height of Jack when turned down to the lowest point. Inches.	Net Rise. Inches.	Whole Height. Inches.	Weight Pounds	Price.
1	1¼	6	8	4	12	10	\$2 50
2	1¼	7	10	6	16	11¾	3 00
3	1½	7½	10	5	15	18½	3 25
4	1½	9	12	7	19	18	3 75
5	1½	10½	14	9	23	25	4 00
6	1¾	9	12	6	18	24	4 25
7	1¾	10½	14	8	22	28¾	4 50
8	1¾	12½	16	10	26	33½	5 00
9	1¾	15	18	12	30	37½	5 50
10	2	8½	12	5	17	31	5 50
11	2	10½	14	7	21	36	6 00
12	2	12	16	9	25	41½	7 00
13	2	16	20	13	33	50	8 00
14	2½	10	14	8	22	48	8 50
15	2½	12	16	10	26	53¼	9 50
16	2½	15½	20	14	34	69	11 00
17	2½	20	24	18	42	85	13 00

CAR JACKS.

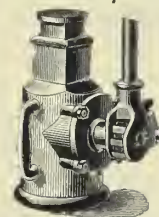
No.	Diam. of Screw. Inches.	Height of Barrel. Inches.	Height of Jack when turned down to the lowest point. Inches.	Net Rise. Inches.	Whole Height. Inches.	Weight. Pounds.	Price.
17½	2	6	10	4	14	20	\$5 00
18	2	8½	12	5	17	31	5 50
19	2	10½	14	7	21	36	6 00
20	2	12	16	9	25	41	7 00

These Jacks have cast iron barrels, with steel screws cut in a lathe. There are no better Jacks made.

FIG. 1670.

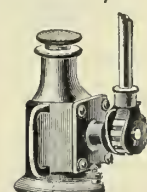


FIG. 1671.



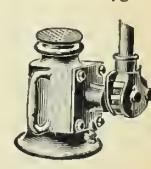
No. 6, 10 Tons.

FIG. 1672.



No. 7, 8 Tons.

FIG. 1673.

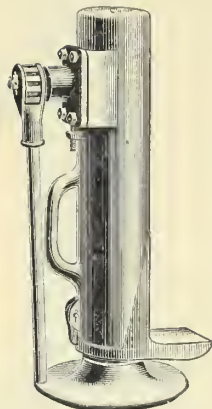


No. 8, 8 Tons.

RAILWAY JACKS WITHOUT BALL BEARING. CAR INSPECTOR'S OR JOURNAL JACKS.

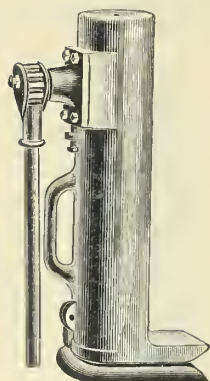
No.	Height. Inches.	Rise. Inches.	Weight. Pounds.	Capacity. Tons.	List Price.
6	11	6	40	10	\$20.00
7	10	5	21	8	18.00
8	7	3	17	8	18.00

FIG. 1674.



CUT OF NORTON'S
NEW STREET RAILWAY JACK.

FIG. 1675.



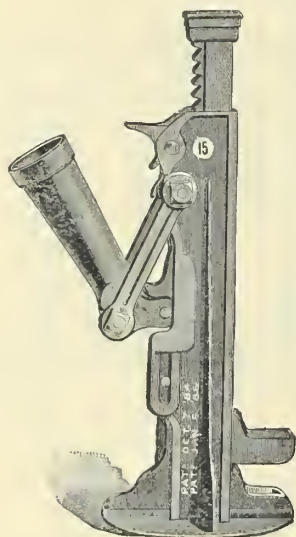
10 TONS JACK,
SQUARE FRONT BASE.

NEW STREET RAILWAY JACKS.

Height over all, 20 inches. Height of foot from ground, 3 inches. Rise, 10 inches. Diameter of base, 8 inches. Weight, 60 pounds. Capacity, 10 tons. Price, \$24.00.

This Jack is designed for electric and street railway service, and has been adopted by the West End Street Railway Co., of Boston, for use on their lines.

FIG. 1677.



POWER JACK No. 15.

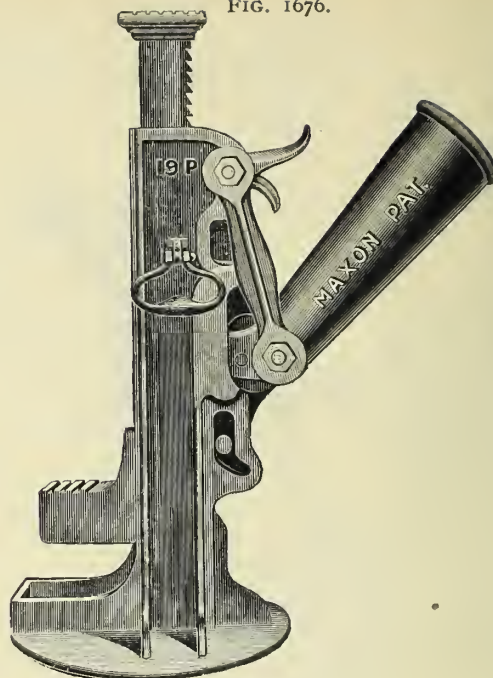
No. 1. The height of Jack is 16 inches, the rise of the bar being 10 inches. Weight of Jack, 32 pounds. Capacity, 2 tons. Price, \$10.00.

No. 3. The height of Jack is 19 inches, the rise of the bar being 11 inches. Weight of Jack, 60 pounds. Capacity, 6 tons, with foot lift. Price, \$16.00.

No. 14. The height of Jack is 24 inches, the rise of the bar being 15 inches. Weight of Jack, 70 pounds. Capacity, 6 tons. Price, \$25.00.

No. 15. The height of Jack is 28 inches, the rise of the bar being 15 inches. Weight of Jack, 115 pounds. Capacity, 13 tons. Price, \$35.00.

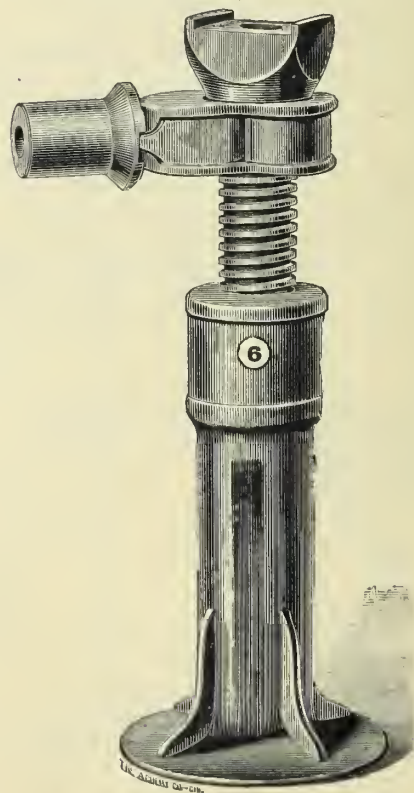
FIG. 1676.



No. 19 POWER JACK.

Capacity, 15 tons. Height, 28 inches. Rise, 15 inches. Weight, 120 pounds. Price, \$40.00.

FIG. 1678.

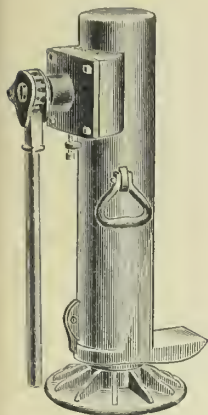


No. 6 BUILDING AND BRIDGE JACK.

Height, 16 inches. Rise, 9 inches. Weight, 28 pounds. Capacity, 20 tons. Steel screw 2 inch diameter. Gun metal nut. Price, \$22.00.

BALL-BEARING JACKS.

FIG. 1679.

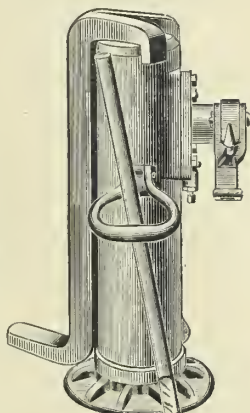


DOUBLE-SPEED BALL-BEARING JACK.

15 Tons, with Ground Lift.

Height, 24 inches. Rise, 10 inches. Diameter of base, 10 inches. Weight, 115 lbs. Capacity, 15 tons. Price, \$60.00.

FIG. 1680.



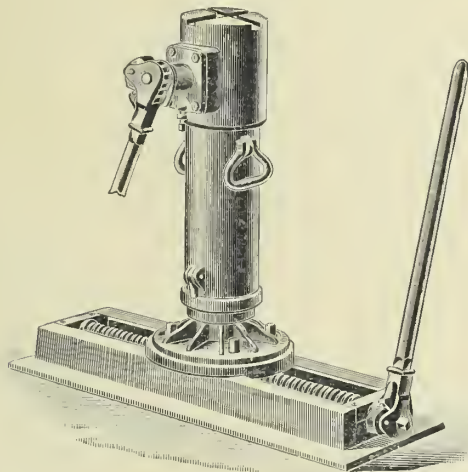
15 TONS CARPENTERS' AND BUILDERS' JACK,

WITH HOOK.

Steel screw, gears and ratchets. Cast iron shell and standard.

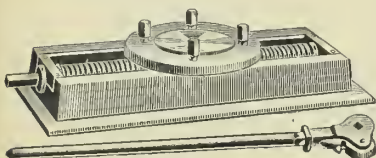
Height, 22 inches. Raises 12 inches. Base, 10 inches. Weight, 80 lbs. Capacity, 15 tons. List price, \$25.00. Hook, extra, \$5.00.

FIG. 1683.



BALL-BEARING TRAVERSING JACK "C," 35 TONS, 20-INCH TRAVERSE.

FIG. 1684.



LIST PRICE OF STEEL BASE TO TRAVERSE.

Traverse.	Weight.	List Price.
20 in.	124 lbs.	\$40 00
15 in.	60 lbs.	35 00

BALL-BEARING TRAVERSE JACKS, COMPLETE.

Capacity.	Height over all.	Rise.	Traverse.	Price.
15 tons.	28 inches.	10 inches.	20 inches.	\$100 00
20 "	30 "	14 "	20 "	120 00
25 "	30 "	14 "	20 "	130 00
35 "	30 "	14 "	20 "	165 00
60 "	30 "	12 "	20 "	215 00
20 "	24 "	9 "	20 "	115 00

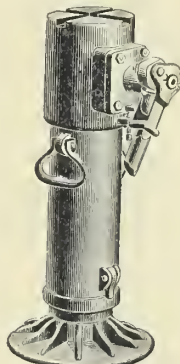
NON-BALL-BEARING TRAVERSE JACKS, COMPLETE.

Capacity.	Height over all.	Traverse.	Price.
15 tons.	30 inches.	15 inches.	\$85 00
10 "	24 "	15 "	59 00
15 "	26 "	15 "	60 00
10 "	16 "	15 "	55 00

These jacks can be taken off the bases and used separately if desired. It is the most complete tool car outfit in the market. Jacks are self-lubricating and require no attention whatever when left in car or shop for months at a time, winter or summer.

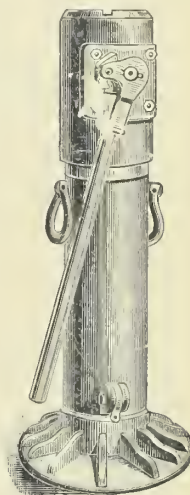
Any size, height or capacity fitted to either base.

FIG. 1681.



26 inch.

FIG. 1682.



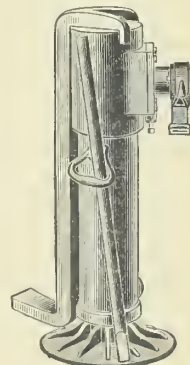
31 inch.

BALL-BEARING JACKS, 35 TONS.

Height, Inches.	Rise, Inches.	Diameter of Base, Inches.	Weight, Pounds.	Capacity, Tons.	List Price.	Hook, Extra.
26	14	12	165	35	\$125 00	\$8 00
31	18	12	190	35	135 00	8 00

This Jack is designed for heavy locomotive and wrecking car service, pulling well pipes, and all other heavy work.

FIG. 1685.

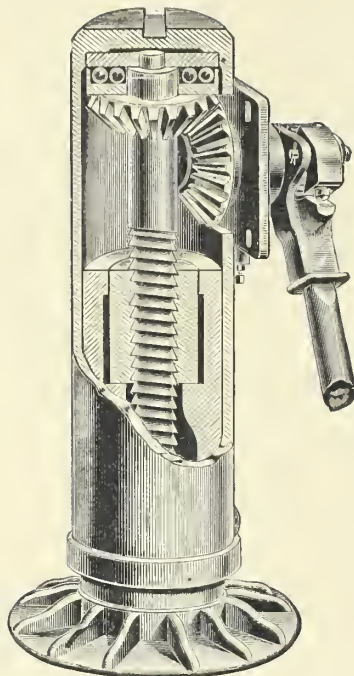


BALL-BEARING JACK, 25 TONS, WITH HOOK FOR GROUND LIFT.

Height, 26 inches. Rise, 14 inches. Diameter of base 10 inches. Weight, 105 lbs. Capacity, 25 tons. List price, \$90.00. Extra hook, \$6.00.

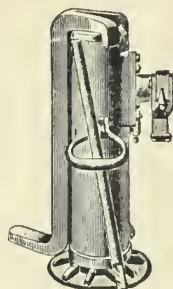
BALL-BEARING JACKS.

FIG. 1686.



Sectional view of Norton's Ball-Bearing Jack.
BALL-BEARING RATCHET SCREW JACKS.

FIG. 1687.

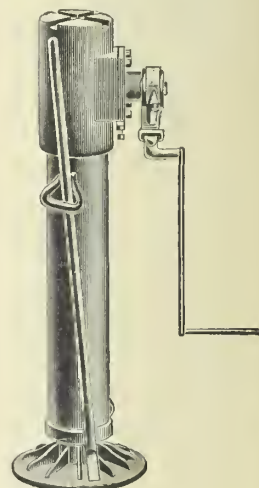


BALL-BEARING JACK, 20 TONS.

Designed for elevated railroad service.

Height, 20 inches; rise, 9 inches; diameter of base, 12 inches; weight, 80 pounds; capacity, 20 tons. List price, \$75.00. Hook, extra, \$5.00.

FIG. 1689.



**BALL-BEARING JACKS,
20 AND 25 TONS.**

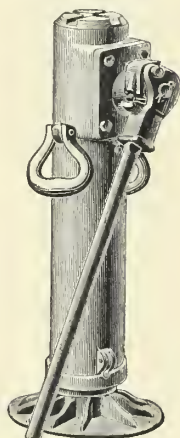
These jacks are intended for car work, where long lift is needed, and can be used with crank on empty cars, or light load, which is much quicker than pumping up with lever. Another saving of time is, the car can be raised and left standing on the jacks without blocking, while trucks are changed.

BALL-BEARING JACK, 20 TONS.

Any of these jacks will be furnished with square base at same price.

Height, 26 inches; rise, 14 inches; Diameter of base, 10 inches; weight, 90 pounds; capacity, 20 tons. List price, \$80.00. Hook, extra, \$6.00.

FIG. 1688.



Height, Inches.	Rise, Inches.	Diameter of Base, Inches.	Weight, Pounds.	Capacity Tons.	List Price.	Hook, Extra.
33	20	12	135	20	\$90.00	\$6.00
33	20	12	135	25	95.00	6.00

PRICE LIST AND SIZES OF "BROAD BASE" HYDRAULIC JACKS.

Jacks to Lift. Tons.	Raise. Inches.	Total Height. Inches.	Diam. of Base. Inches.	Weight. Pounds.	Price.
4	3	11	5 (sq.)	26	\$45 00
4	12	25	8 (rd.)	54	56 00
7	3	11	6 (sq.)	32	50 00
7	12	25	11 (rd.)	93	64 00
7	18	31	11	102	67 00
7	24	37	11	114	70 00
10	12	25	12	98	76 00
10	18	31	12	110	88 00
10	22	36	12	115	96 00
10	24	38	12	120	100 00
15	12	25½	13	140	100 00
15	18	32	13	161	120 00
15	22	36½	13	180	135 00
20	12	26	13¼	156	120 00
20	18	32	13¼	182	140 00
20	22	36	13¼	213	150 00
20	24	38	13¼	235	160 00
30	9	21½	13½	180	136 00
30	12	26½	13½	200	160 00
30	18	34	13½	243	200 00
30	22	38	13½	304	225 00
40 all steel	12	27	15	245	180 00

FIG. 1691.

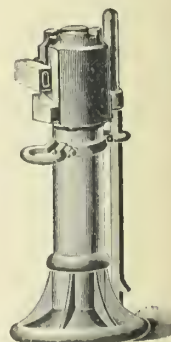
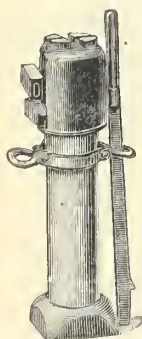


FIG. 1690.

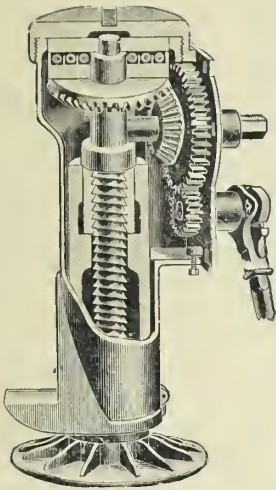


Jacks to Lift. Tons.	Raise. Inches.	Height. Inches.	Size of Bottom. Inches.	Weight. Pounds.	Price.
4	3	11	3½ sq.	22	\$40 00
4	12	25	3½ "	41	50 00
7	3	11	4½ "	25	46 00
7	12	25	4½ "	50	56 00
7	18	31	4½ "	72	60 00
7	24	37	4½ "	80	64 00
10	12	25	5¼ "	75	64 00
10	18	31	5¼ "	92	72 00
10	22	35	5¼ "	109	78 00
10	24	37	5¼ "	120	80 00
15	12	25	5¾ "	100	80 00
15	18	32	5¾ "	118	92 00
15	24	38½	6 "	143	100 00
20	12	26	6½ "	121	96 00
20	18	32½	6½ "	155	115 00
30	9	21½	9¼ "	160	120 00
30	12	26½	11 "	218	140 00

This style is to be used when the jack stands upon the ground or light board, and can be placed under the work, or where steadiness is required. They are used largely under locomotives, cars, etc. Special lengths made to order at price of next longer length.

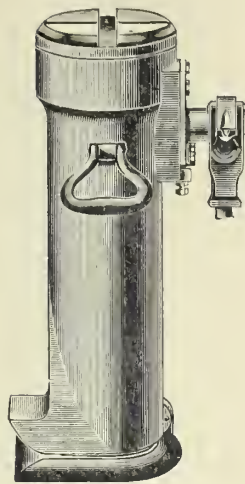
BALL-BEARING AND HYDRAULIC JACKS.

FIG. 1692.



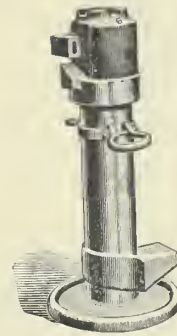
70-TONS BRIDGE JACK.

FIG. 1693.



40-TONS BRIDGE JACK.

FIG. 1694.



LARGE ROUND BASE CLAW JACK.

Jack to lift.	Raise.	Total height.	Diameter, base.	Weight.	Height of Claw.	Price.
10 tons.	10 in.	25 in.	12 in.	125 lbs.	4 in.	\$100 00
15 "	10 "	25½ "	12½ "	175 "	4 "	140 00
20 "	10 "	26 "	13 "	225 "	4½ "	185 00

BALL-BEARING COMPOUND BRIDGE JACKS, 40 TO 70 TONS.

Height.	Rise.	Diameter of Base.	Diameter of Head.	Weight.	Capacity.	List Price.
26 in.	12 in.	14 in.	10½ in.	315 lbs.	70 tons.	\$200 00
26 in.	12 in.	14 in.	10½ in.	250 lbs.	60 tons.	175 00
21½ in.	10 in.	8 x 6 in.	8 in.	180 lbs.	40 tons.	140 00

CLAW HYDRAULIC JACKS.

PRICE LIST AND SIZES.

Jacks to Lift. Tons.	Raise. Inches.	Height when down. Inches.	Height of Claw. Inches.	Weight. Pounds.	Price.
4	12	25	4¼	58	\$58 00
7	12	25	4½	86	68 00
7	18	31½	4½	102	70 00
7	24	38	4½	120	72 00
10	12	25½	5¼	117	80 00
10	18	32	5¾	142	90 00
15	12	25½	6½	153	120 00
15	18	32¾	6½	178	135 00
20	12	25½	6	185	160 00
20	18	32½	6	222	180 00
30	12	26¾	5½	318	200 00

FIG. 1695.

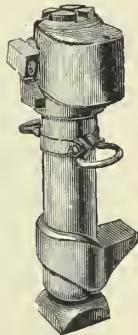
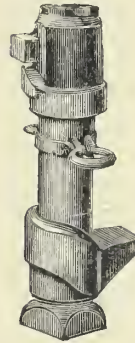


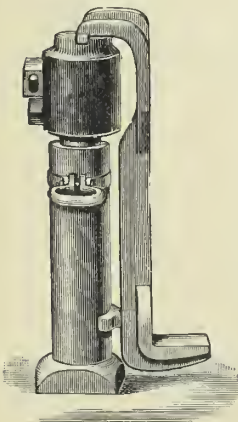
FIG. 1696.



"HORIZONTAL CLAW" HYDRAULIC JACKS.

Jack to lift.	Raise.	Length when closed.	Weight.	Price.
4 tons.	12 inches.	24½ inches.	63 lbs.	\$58 00
7 "	12 "	25½ "	90 "	68 00
7 "	24 "	38 "	127 "	72 00
10 "	12 "	25½ "	125 "	80 00
10 "	18 "	32 "	150 "	90 00
15 "	12 "	25½ "	160 "	120 00
20 "	12 "	25½ "	185 "	160 00
20 "	18 "	32½ "	220 "	180 00
30 "	12 "	26¾ "	320 "	200 00

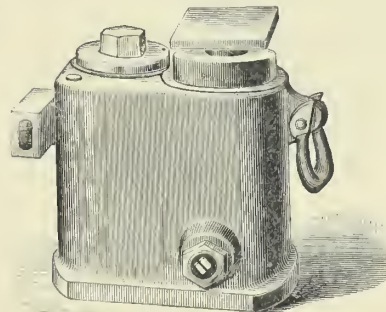
FIG. 1699.



"INDEPENDENT CLAW" HYDRAULIC JACKS.

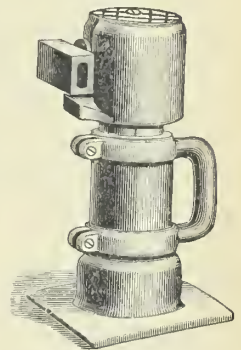
Size.	Lift.	Plain Style.	Base Style.	Horizontal Style.
7 tons.	12 in.	\$64 00	\$72 00	\$68 00
7 "	18 "	70 00	77 00	75 00
10 "	12 "	74 00	86 00	68 00
10 "	18 "	84 00	100 00	88 00
15 "	12 "	92 00	115 00	98 00
15 "	18 "	107 00	135 00	113 00
20 "	12 "	120 00	135 00	128 00
20 "	18 "	145 00	160 00	155 00
30 "	12 "	160 00	185 00	170 00

FIG. 1697.



LOW STYLE.

FIG. 1698.



BASE STYLE.

HYDRAULIC "JOURNAL BOX" HYDRAULIC JACKS.

	Capacity.	Total Height.	Base.	Raise.	Weight.	Price.
Plain style,	4 ton	11 in.	3½ x 3½	3 in.	22 lbs.	\$40.00
" "	7 "	11 in.	3½ x 3½	3 in.	25 lbs.	46.00
Base "	4 "	11 in.	5 x 5	3 in.	23 lbs.	45.00
" "	7 "	11 in.	6 x 6	3 in.	29 lbs.	50.00
" "	10 "	11 in.	6 x 6	3 in.	36 lbs.	60.00
Low "	7 "	11 in.	5½ x 8¼	6 in.	68 lbs.	60.00
" "	10 "	11 in.	5½ x 8¼	6 in.	80 lbs.	70.00

FIG. 1700.

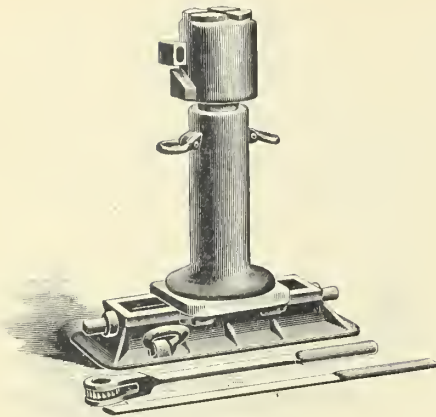
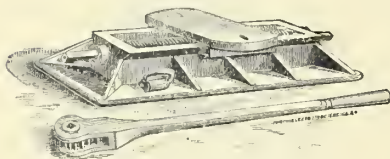


FIG. 1702.



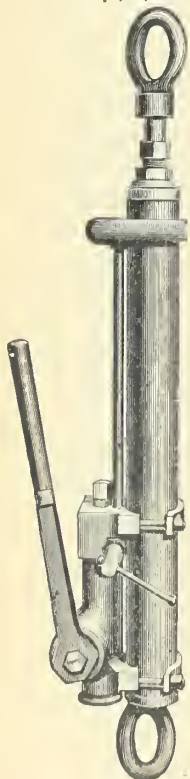
PLAIN TRAVERSE.

TRAVERSING JACK.

The carriage is 10 x 12 inches, and in the regular size, has 16 inches motion with a height of 5 inches.

Price, without Jack,	-	-	-	\$40 00
Price, with 10 ton hydraulic Jack,	-	-	-	116 00
Price, with 15 ton hydraulic Jack,	-	-	-	140 00
Price, with 20 ton hydraulic Jack,	-	-	-	160 00
Price, with 30 ton hydraulic Jack,	-	-	-	176 00

FIG. 1704.



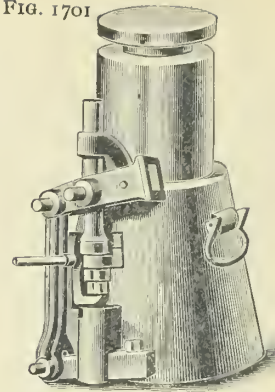
IMPROVED HYDRAULIC PULLING JACK.

For hoisting or pulling heavy weights in engine rooms or other circumscribed places.

Hooks instead of rings will be furnished if desired.

Jack to Pull. Tons.	Inches.	Total Length. Inches.	Weight. Pounds.	Price.
7	12	30	65	\$150
7	24	42	95	165
10	12	30	85	200
10	24	42	115	220
15	12	30	100	250
15	24	44	150	275
20	12	32	140	300
20	24	44	200	325
30	12	34	180	360
30	24	46	300	400

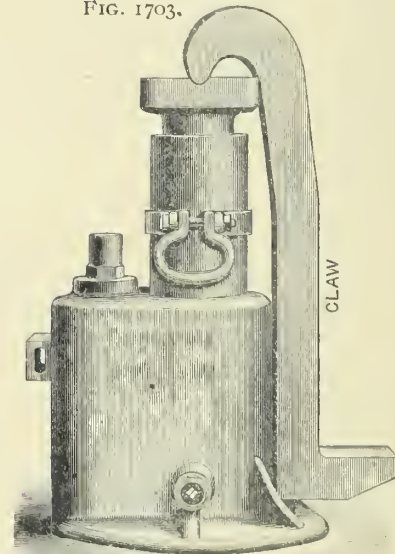
FIG. 1701



"DOUBLE PISTON OUTSIDE PUMP" VERTICAL HYDRAULIC JACKS.

Jack to lift.	Raise.	Total Height.	Weight.	Diameter. of Base.	Price.
60 tons	12 inches	22 inches	380 lbs.	12 inches	\$225.00
60 "	18 "	28 "	430 lbs.	13 "	260.00
100 "	12 "	22 "	480 lbs.	13 "	300.00
100 "	18 "	28 "	580 lbs.	14 "	340 00
125 "	12 "	23 "	600 lbs.	14 "	360.00
125 "	18 "	29 "	700 lbs.	15 "	400.00

FIG. 1703.

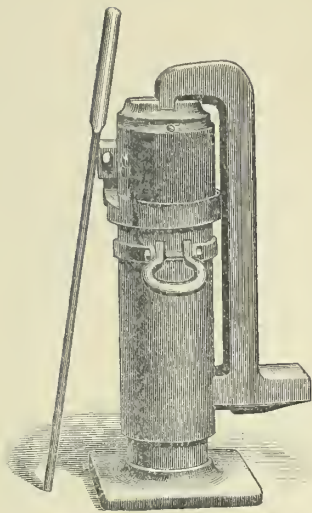


GKIRKHAM

"LOW" HYDRAULIC JACKS.

Jack to Lift Tons.	Raise Inches.	Height.	Total Weight	Diameter Base.	Price.	Extra for Claw.
10	12	20 inches	120 lbs.	10	\$80.00	\$8.00
15	12	20 "	180 "	12	100.00	10.00
15	18	26 "	200 "	12	120.00	12.00
15	22	30 "	215 "	12	140.00	14.00
20	12	20 "	190 "	12	120.00	12 00
20	18	26 "	235 "	12	150.00	16.00
20	22	30 "	270 "	12	165 00	18.00
30	12	21 "	245 "	13	150.00	18.00
30	18	27 "	265 "	13	175 00	20 00
30	24	33 "	290 "	14	210.00	24.00
45	12	21 "	293 "	14	175.00	22.00
45	18	27 "	320 "	14	225.00	24.00
60	9	18 "	290 "	15	185.00	22.00
60	12	21 "	360 "	15	200.00	24.00
80	12	22 "	400 "	18	235.00	26.00
100	9	18 "	550 "	15	225.00	26.00
100	12	22 "	670 "	20	275.00	30.00

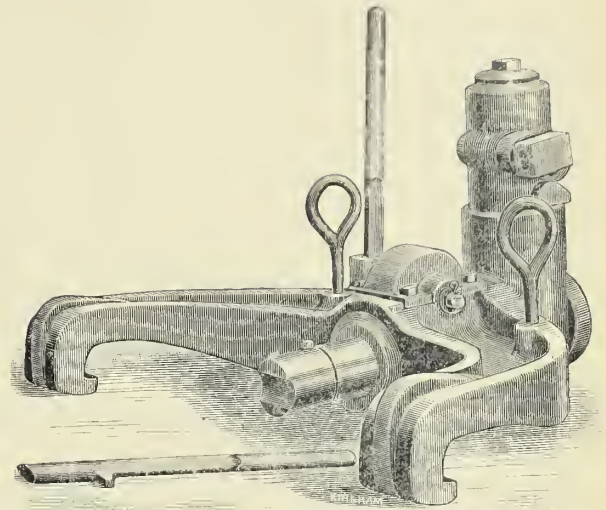
FIG. 1705.



"WRECKING" HYDRAULIC JACK.

Capacity. Tons.	Raise. Inches.	Height. Inches.	Weight. Pounds.	Price.	STEEL CLAW EXTRA. Weight. Pounds.	Price.
15	18	32	169	\$110 00	50	\$15 00
20	18	32	200	135 00	65	20 00
30	9	20	190	135 00	50	18 00
30	12	27	250	165 00	63	20 00
30	18	33	300	190 00	80	24 00

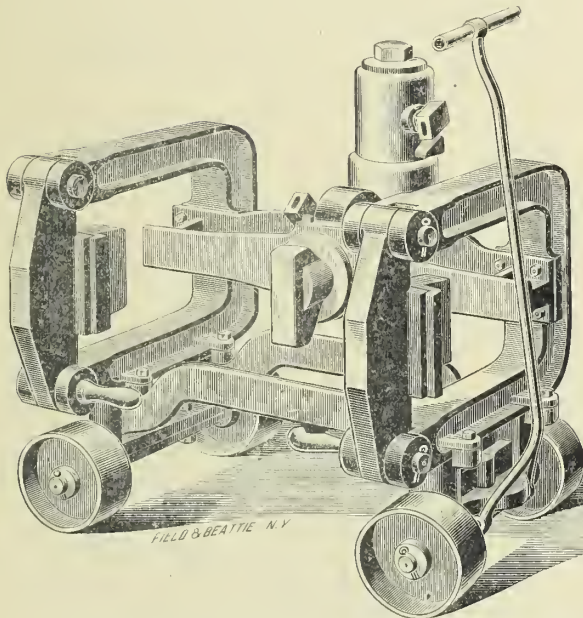
FIG. 1706.



HYDRAULIC "T" RAIL BENDER.

No. 3 for 70 pound rail weighs 200 pounds; price, \$160. No. 4 for 100-pound rail weighs 275 pounds; price, \$200.

FIG. 1707.



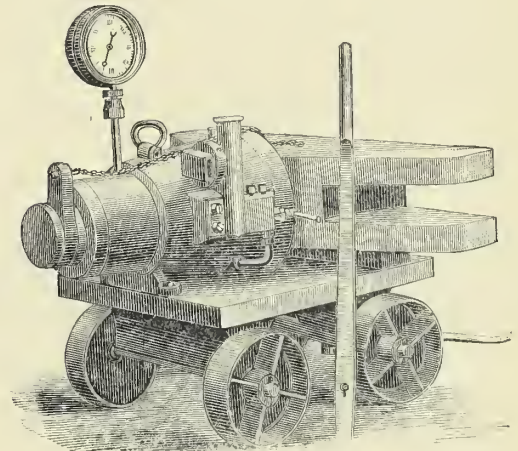
MOUNTED 10-INCH GIRDER RAIL BENDER.

With Hinged Yoke.

The yoke swings back for the rail to be inserted sideways. One set of blocks are necessary for each shape of rail to be bent. The ram exerts a bending power of 75 tons, has a motion of $2\frac{3}{4}$ inches, and is graduated to assist in making regular bends. The outer blocks are 26 inches apart. The action is similar to that of the Hydraulic Punches—complete control of the ram by lever, without pumping, and accessibility of parts. The truck is made of iron, the rest of the tool is steel. One set of bending blocks only are furnished with the tool. Weight of the tool, 980 pounds.

Price, \$330 00

FIG. 1708.



PLAIN CRANK PIN PRESS.

This cut shows plain pattern of crank pin press, designed for forcing crank pins into locomotive driving wheels, forcing on and off balance wheels, crank discs, pulleys, gears, drums, etc. The operating mechanism is the same as in the best style of large horizontal jacks, in which the piston is inclosed, thus keeping foreign matter from the pump. The operator, when using it, stands close to the work and gauge. To a projection on the ram a chain is attached for easily forcing the ram back into the cylinder. The pump valves are large and fall on their seats, requiring no rush of water to seat them, and in all parts are made so that they can be easily examined or repaired.

Press.	Movement.	Weight	Price
60 tons	12 inches	950 pounds	\$265.00
100 "	12 "	1250 "	350.00
125 "	12 "	1600 "	400.00
150 "	12 "	2200 "	475.00

Other sizes built special to order. As working conditions vary so much, rods are not included, and are made to order only.

VREELAND PATENT TRANSFER PIT JACK.

The attention of railroad companies and master mechanics is respectfully called to this very simple, cheap and quick device for removing from under locomotives either the drivers or trucks and replacing the same. All railroad men recognize the necessity for the occasional removal of locomotive drivers and trucks, but have lacked a tool which is safe, expeditious and at the same time not too cumbersome and expensive.

The advantages claimed for this invention are that the engine is not disturbed from its regular height; there is no jacking up first one end of the engine and then the other until the drivers will roll out under the tail-piece, and then obstructing the work underneath and the floor around by girders and blocking. They are neither cumbersome nor as expensive as drop tables or large steam hoists, and no floor space is required for the tool.

The cut shows that the working part of this device is a specially designed hydraulic jack mounted on a track which crosses the regular pit at right angles. All working parts of this jack are designed so that they can be gotten at easily without disturbing any other parts. The top of the ram has a semi-cylindrical head in which the axle rests and in which it may be revolved so that it can be dropped on a track running at any angle with the pit.

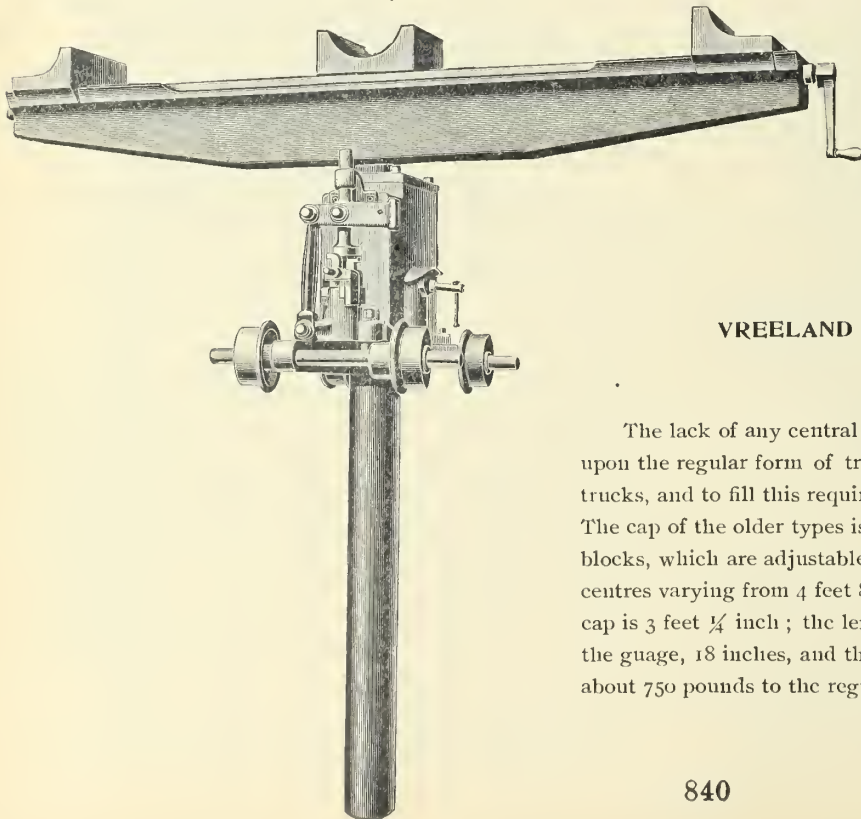
In operating, the engine is run over the pit until the axle or truck to be removed is over the jack track; the jack is then run under the locomotive and pumped up until the weight is taken off the section of tracks, which are then moved sideways, when the wheels are lowered until they clear the frame, when the jack is moved sideways, and when as far as desired is pumped up and track placed under them again, and jack ram lowered until the head clears, when they can be rolled away. Three men only are required to work it, one in the pit and one at each wheel.

Four pair of drivers have been placed under a consolidation engine by a gang of five men in thirty-eight minutes, and it is a common occurrence to run an engine into the shop or round-house in the morning after her regular trip and drop a pair of drivers, refit one or more new boxes and send her out on the after noon trip without dropping the fire, thus saving expense and time of knocking out and rebuilding it.

A special circular for this tool has been prepared, giving minute details and showing the several standards adopted by various railroad companies.

Price, including one set of pit drawings, - - - - - \$350 00

FIG. 1710.



VREELAND PIT JACK FOR ENGINE TRUCKS.

The lack of any central point under the forward truck which could sustain it upon the regular form of transfer jack prevented its adoption for removing the trucks, and to fill this requirement we devised, in 1892, this type of the tool. The cap of the older types is replaced by a long steel beam having sliding bearing blocks, which are adjustable by a right and left screw, to take trucks with axle centres varying from 4 feet 8 inches to 6 feet 8 inches. The height from rail to cap is 3 feet $\frac{1}{4}$ inch; the length from rail to the end of cylinder, 3 feet $10\frac{1}{2}$ inches; the gauge, 18 inches, and the wheels 6 inches in diameter. The steel beams add about 750 pounds to the regular style. Price, \$500.

FIG. 1709.

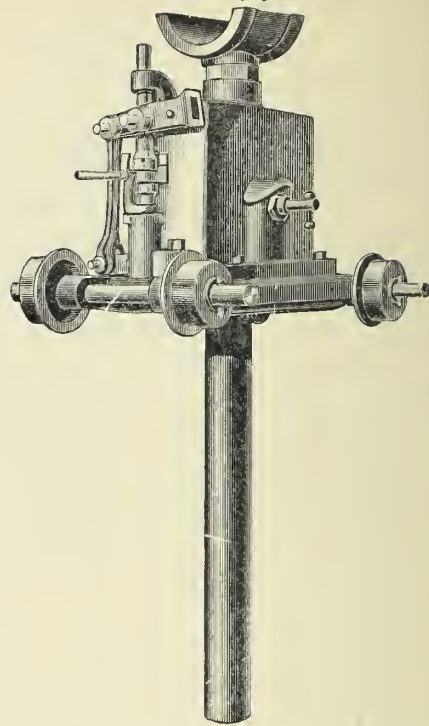
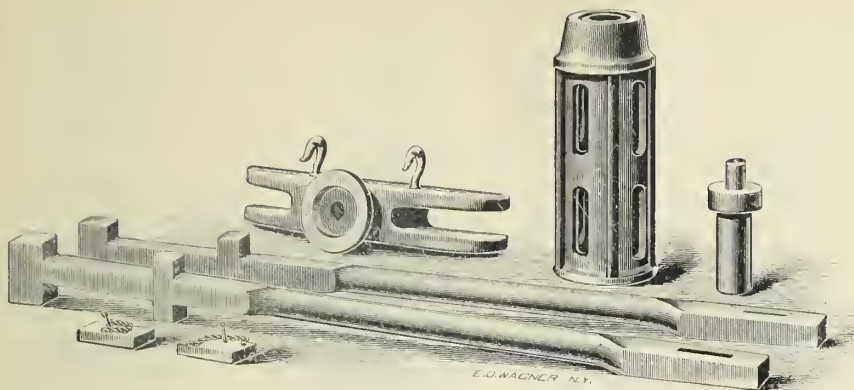


FIG. 1711.

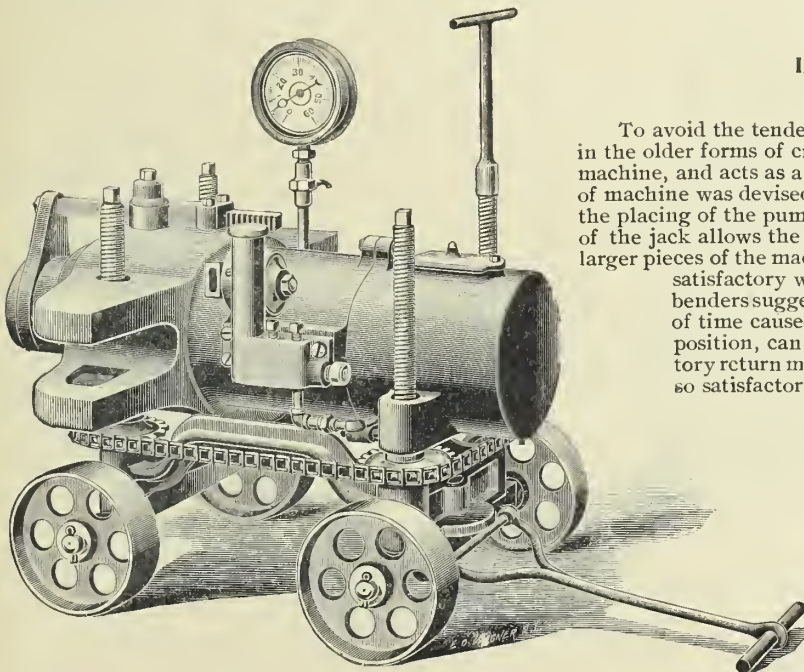


the special attachments for taking out are a chuck which is about 24 inches long, and a forcing pin. The rods are made with two collars at one end and with a pin at the other. These prevent a press from assuming a position other than true, and also avoids the liability of screwing up a nut unevenly. The beam is made with two hooks, so that it may be swung from the axle and avoid blocking, and is sufficiently light so that two men can handle it without trouble. It is made with the same length arms as the beam upon the press. The approximate weights of the attachments complete are as follows :

60 tons pressure,	-	-	-	-	675 pounds
100 tons pressure,	-	-	-	-	750 pounds
125 tons pressure,	-	-	-	-	850 pounds
150 tons pressure,	-	-	-	-	1000 pounds

And the prices are, respectively, \$105, 120, 135 and 160.

FIG. 1712.



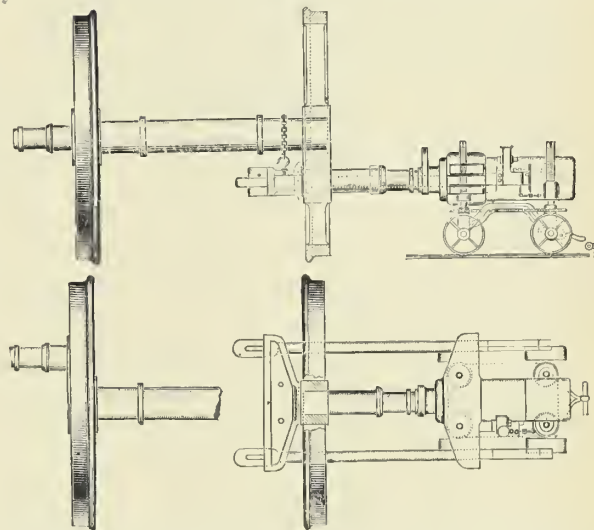
The length of beam on the 60 ton is 28 inches ; 100 ton, 32 inches ; 125 ton, 34 inches ; 150 ton, 36 inches. The rods, chucks and pins are not included in the price of the machine, as the requirements for these are so variable. If adjustable is not wanted, price is \$25 00 less.

SPECIAL FITTINGS FOR CRANK PIN PRESSES.

IN CONNECTION WITH LOCOMOTIVE WORK.

When putting crank pins in, nothing is required in connection with the Crank Pin Press except rods and a pair of washers ; but, in taking out the crank pins more appliances are necessary, and for this purpose, as shown by the view we furnish a steel beam, faced, and recessed slightly to allow all the riveting length to be forced through the hub. This beam can then be used in place of washers upon the rods in forcing the pin in, and better work done. Then

FIG. 1713.



METHOD OF USING SPECIAL FITTINGS FOR CRANK PIN PRESS.

IMPROVED CRANK PIN PRESS.

1893 TYPE AND RAISING SCREWS.

To avoid the tendency to force the crank pin out of true, which was the case in the older forms of crank pin presses when the beam is at the rear end of the machine, and acts as a weight with a leverage of the length of the press, this type of machine was devised, bringing the beam as close as possible to the work, and the placing of the pump close behind it with the lever at right angles to the line of the jack allows the operator to watch closely the work he is doing. All of the larger pieces of the machine are made of steel, in order to secure lightness. The very satisfactory working of the rack and pinion in hydraulic punches and rail benders suggested the desirability of applying it to this tool, so that the loss of time caused in the older types by having to pump the ram out to working position, can now be done away with, and at the same time a very satisfactory return motion is attained. We have retained the rack and pinion pump so satisfactorily used for the last few years upon this tool. The four sprocket wheels on the raising screws are, when sent out, connected with one chain which can, if desired, be placed upon them in pairs, or taken off entirely. The hydraulic gauge has one of the improved safety couplings to avoid the shock caused by the sudden releasing of pressure, and the working parts of the press are all of them easy of access for repairs or examination. The valves are situated directly beneath bonnets, fitted metal to metal, and requiring no packings.

	Movement.	Weight About.	Price.
60 tons	12 inches	750 pounds	\$325 00
100 "	"	900 "	390 00
125 "	"	1150 "	450 00
150 "	"	1450 "	525 00

WROUGHT IRON AND STEEL PULLEY BLOCKS.

FIG. 1717.

FIG. 1718.

FIG. 1719.

FIG. 1714.

FIG. 1715.

FIG. 1716.



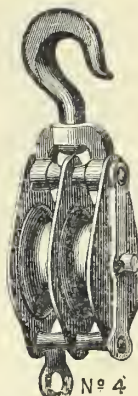
No. 1 Snatch,
Self Acting.



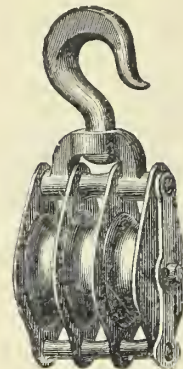
No. 2 Snatch,
New.



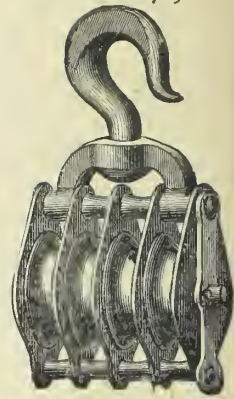
No. 3



No. 4



No. 5.



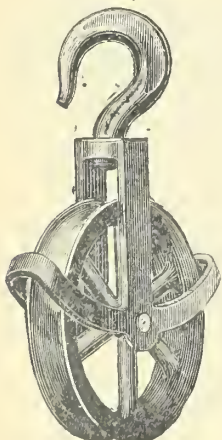
No. 6.

DIMENSIONS AND PRICES.

Rope size, inches,	1-2	5 8	3-4	7 8	1	1 1 4	1 1 2	1 3 4	2	2 1 4	2 1 2	2 3 4	3 1 4	3 1 2
Chain size, inches,	-	-	-	3-16	1-4	5 16	3 8	7-16	1 2	5-8	11-16	3-4	13-16	7-8
Length of shell, inches,	4 3 4	6	7 1-2	8 1-2	9 1-2	10 1-2	12	13	14 1-2	17	19	21	23	25
Diameter of sheave, inches,	2 1-2	3 1-2	4	4 3-4	5	6	7	8	9	10	11	12	14	15
Diameter of mortise, inches,	3-4	7-8	1	1 1-4	1 3 8	1 1-2	1 3 4	2	2 3-8	2 3-4	3 1-4	3 1-2	3 3-4	4 1-4
Snatch, No. 1,	\$2.70	2.75	3.00	3.60	4.80	5.50	6.90	8.80	13.20	27.40	33.20	N. B.—The 2 3/4 inch and larger are quoted for only upon request.		
Snatch, No. 2,	3.80	3.85	4.40	5.25	6.35	7.45	8.80	11.60	16.50	23.20	31.20			
Single, No. 3, with hook,	1.65	2.10	2.25	3.05	3.65	4.35	5.50	7.25	11.60	17.60	26.40			
Double, No. 4, with hook,	2.20	2.90	3.40	4.20	5.50	6.65	9.25	13.00	18.50	29.60	53.00			
Triple, No. 5, with hook,	2.75	3.45	4.35	5.50	7.50	9.25	12.70	18.50	-	-	-			
Triple, as No. 7, with ring,	-	-	-	-	-	-	-	-	24.60	42.40	69.50			
Triple, as No. 8, with shackle,	-	-	-	-	-	-	-	-	24.60	28.90	47.60			
Fourfold, No. 6, with hook,	3.60	4.35	5.20	7.50	9.55	12.10	17.85	-	-	-	-			
Fourfold, as No. 7, with ring,	-	-	-	-	-	-	-	26.00	37.50	70.50	105.00			
Fourfold, as No. 8, with shackle,	-	-	-	-	-	-	-	26.00	37.50	43.50	64.00			
Iron sheaves, plain,	.15	.20	.30	.50	.70	.85	1.40	1.80	2.35	3.30	4.50			
Iron sheaves, roller bushed,	.55	.75	.85	1.10	1.35	2.00	2.75	3.75	5.00	-	-			
Brass sheaves, plain,	.55	.85	1.25	2.10	2.75	3.45	4.70	6.90	10.30	17.50	21.00			

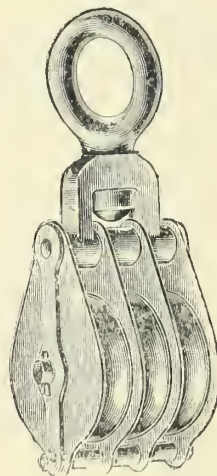
N. B.—The single and double blocks for 2 1/4 and 2 1/2 inch rope have swivel rings instead of hooks. Blocks, if required with roller bushed or all brass sheaves, will be charged the extra price for said sheaves minus the price of common sheaves. On the larger blocks we generally supply the upper one of a pair with a shackle, and the lower one with a swivel ring, but they may be ordered with shackle or ring as desired. Becket or chain eye supplied to one block of every pair.

FIG. 1720.



Gin Block.

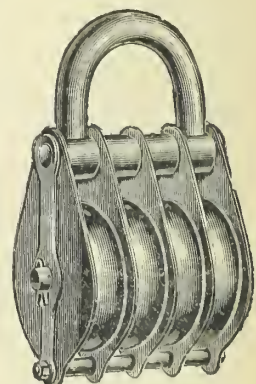
FIG. 1721.



No. 7.

Three Sheave with Swivel Ring.

FIG. 1722.



No. 8.

Four Sheave with Shackle.

GIN BLOCKS.

The frame is wrought iron in all sizes except 6 and 7 inch, which are malleable iron. Wrought iron hooks, sheaves bored and pins turned.

Diameter of sheave, inches,	6	7	8	9	10	11
Rope diameter, inches,	1	1 1-8	1 1-8	1 1-8	1 1-8	1 1-8
Price, each,	\$2.55	3.15	3.90	4.00	4.30	4.60
Extra sheaves, each,	.60	.75	.90	1.10	1.20	1.35
Diameter of sheave, inches,	12	14	16	18	20	22
Rope diameter, inches,	1 1-8	1 3-8	1 1-2	1 1-2	1 1-2	1 1-2
Price, each,	\$5.30	6.00	7.70	8.85	10.50	12.00
Extra sheaves, each,	1.60	2.15	3.15	3.45	4.15	4.90

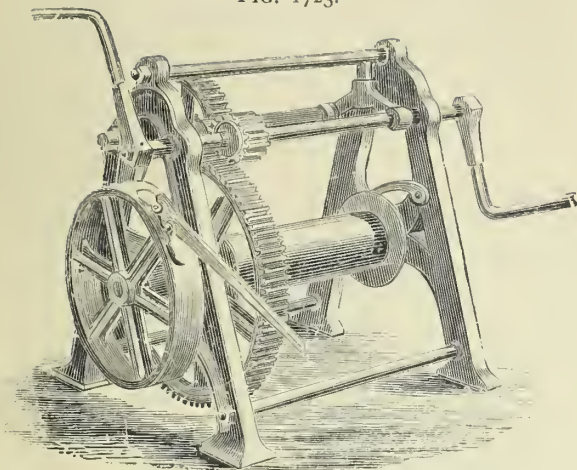
CRANE PULLEY BLOCKS.

The frame is wrought iron in all sizes except 9 inch and smaller, which are malleable iron. Wrought iron hooks, sheaves bored and pins turned.

Diameter of sheave, inches,	4 3-4	5	6	7	8	9
Takes chain, diameter, inch's	3-16	1-4	5-16	3-8	7-16	1-2
Approximate weight, pounds,	4 1-4	6	9	13	23	30
Test load, tons,	3-4	1	1 1-2	2	3	4
Price, each,	\$1.85	2.30	2.75	3.50	5.50	7.00
Diameter of sheave, inches,	10	11	12	14	15	16
Takes chain, diameter, inch's	9-16	5-8	11-16	3-4	13-16	7-8
Approximate weight, pounds,	56	72	90	121	184	207
Test load, tons,	5	6	8	10	12	13
Price, each,	\$20.00	26.00	32.00	43.00	55.00	66.00

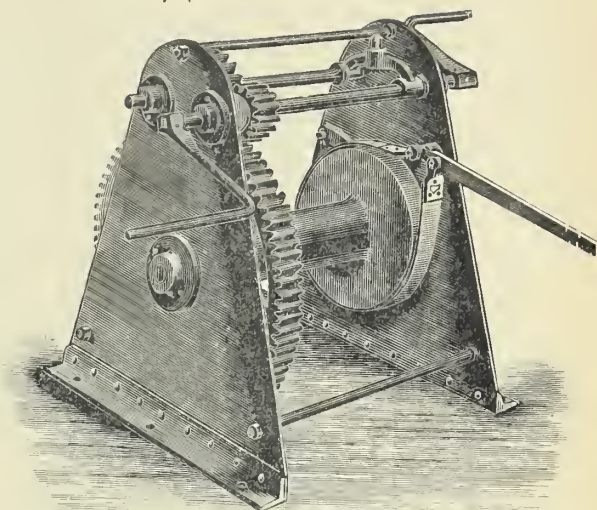
IRON HOISTING CRABS OR CARGO WINCHES.

FIG. 1723.



Single purchase, cast iron sides, with lever brake.
Screw brake supplied if required. Sizes No. 101 to 104.

FIG. 1724.



Single purchase, wrought iron sides, showing lever brake.
Screw brake supplied if required. Sizes No. 131 to 134.

SINGLE PURCHASE CARGO WINCHES OR HOISTING CRABS.

WITH CAST IRON SIDES.

Size, No.	101	102	103	104
Lifts with a 2 and 3 sheave pulley block, } tons,	2	3	4	5
Lifts direct from barrel, cwt.,	8	12	16	20
Size of barrel, inches,	12 x 4½	14 x 4½	16 x 4½	18 x 4½
Approximate weight, pounds,	250	280	340	365
Price, with lever brake, each,	\$30.00	32.00	37.00	42.00
Extras, if ordered :				
screw brake, - each,	3.50	3.50	3.50	3.50
brass bushing, - each,	6.50	6.50	7.00	7.50

WITH WROUGHT IRON SIDES.

Size, No.	131	132	133	134
Capacity and dimensions as above, - - tons,	2	3	4	5
Price, with lever brake, each,	\$43.00	45.00	52.00	57.00
Extras, if ordered :				
screw brake, - each,	3.50	3.50	3.50	3.50
brass bushing, - each,	6.50	6.50	7.00	7.50

DOUBLE PURCHASE CARGO WINCHES OR HOISTING CRABS.

WITH WROUGHT IRON SIDES.

Size, No.	140	141	142	143	144	145	146	147	148
Capacity and dimensions as above, tons,	4	5	6	7	8	10	12	15	20
Price, with lever brake, - each,	\$58.00	64.00	78.00	83.00	89.00	95.00	103.00	125.00	200.00
Extras, if ordered :									
screw brake, - each,	5.00	5.00	5.00	5.00	5.00	10.00	10.00	10.00	10.00
brass bushing, - each,	8.50	9.00	9.50	10.00	10.50	11.00	12.00	15.00	19.00

The double purchase crab is arranged with two speeds, and can be worked either single or double purchase. The crank shaft can be thrown out of gear when lowering with the brake, so the handles will not fly around. Lowering can be done either with the handles or with the brake. The power is increased or diminished by the number of pulleys used in the blocks.

TREBLE PURCHASE MANILLA ROPE CRABS.

Size, No.	406	408	410	415
Lifts direct from barrel, tons,	6	8	10	15
Size of barrel, - inches,	36 x 9	39 x 10	42 x 12	42 x 15
Approximate weight, tons,	1 1-4	1 1-2	2 1-4	3 1-2
Price, with screw brake and brass bushing, each,	\$560.00	675.00	860.00	1275.00

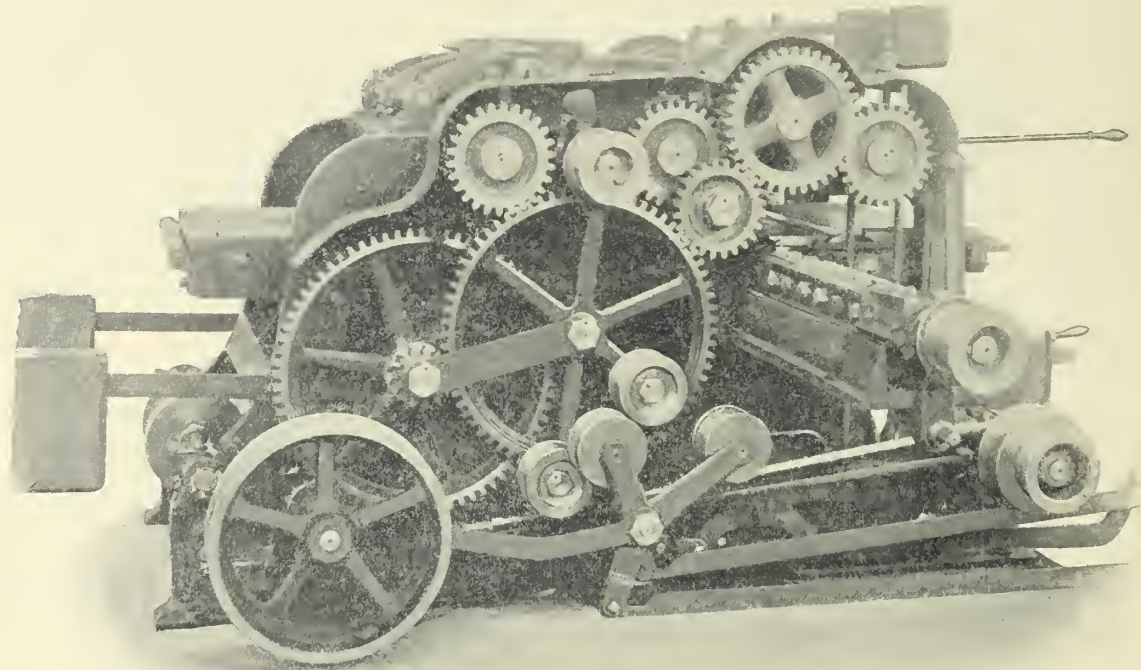
TREBLE PURCHASE WIRE ROPE CRABS.

WITH LARGER BARRELS.

Size, No.	503	504	505	508
Lifts direct from barrel, tons,	3	4	5	8
Diameter of barrel, inches,	20	22	25	30
Length of barrel, inches,	21	22	24	27
Circumference of wire rope recommended, inches,	3	3 1-2	4	5
Length taken in one lap, feet,	110	120	130	140
Approximate weight, tons,	1 1-4	1 1-2	2 1-4	3 1-2
Price, with screw brake and brass bushing, - each,	\$560.00	675.00	860.00	1275.00

PRENTISS TOOL & SUPPLY CO.

FIG. 1725.



"NEW IDEA" DOUBLE SURFACER.

THIS is the latest improved machine of the kind on the market.

The bed raises and lowers by power on inclines.

It is provided with divided rolls and chip breakers.

It has two rates of feed, which are under the control of the operator by means of lever placed convenient, so that when running on the fast feed and it is desired to plane on the slow feed over a bad, knotty or cross grained spot, by a single movement of the lever the feed can be reduced one-half until the imperfect spot has been planed, when by reversing the lever the speed is immediately increased to its full capacity.

The bottom head is placed in front, so that in planing band sawed lumber the uneven portion can be taken off with the bottom head, thus leveling the stock and giving the board a true or level surface, or bearing, upon the table so that it will rest evenly on the bed of the machine when the top head is doing its work.

The lower head is easily accessible, as shown in the cut, and has a vertical adjustment on inclines, giving a solid bearing. The bearings are unusually long and heavy, and the cylinders are made of forged steel and carry four knives each.

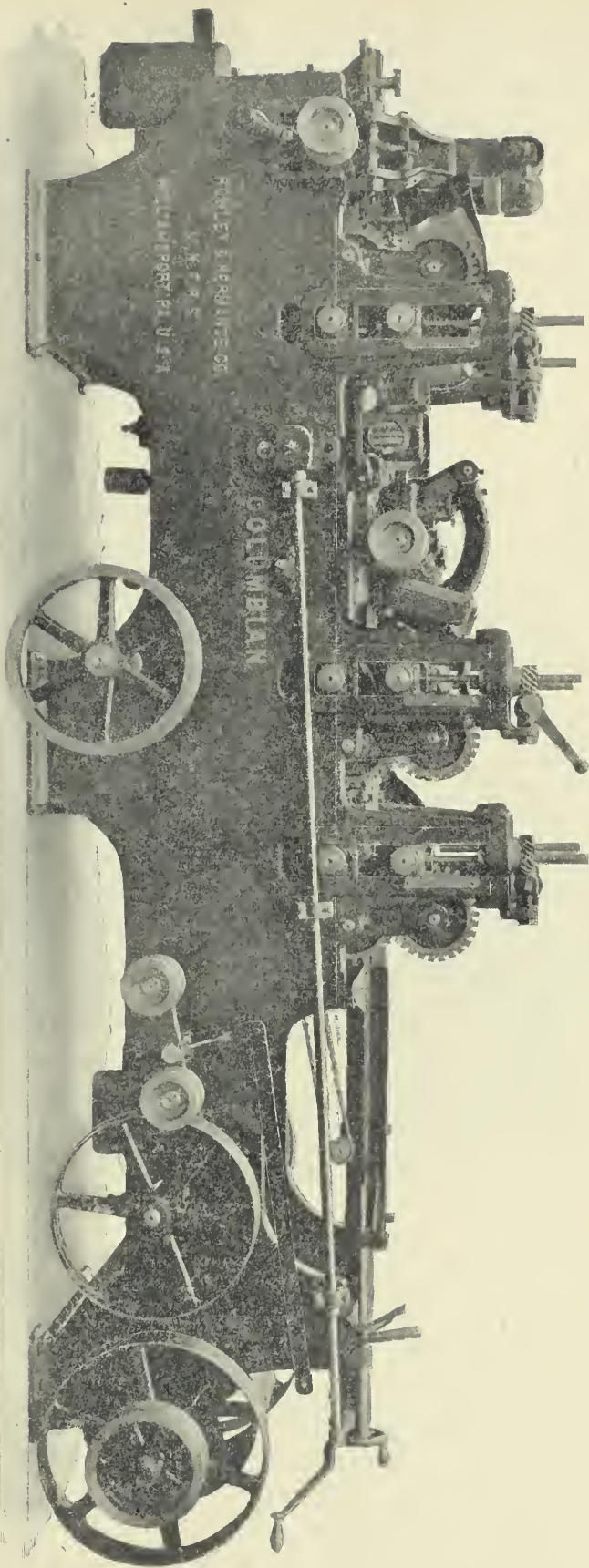
To plane 28 inches wide by 10 inches thick, 6 roll, tight and loose pulleys 14 inches diameter by 8 inch face, and should run 850 revolutions per minute.

To plane 30 inches wide by 12 inches thick, 8 roll, tight and loose pulleys 16 inches diameter by 10 inch face, and should run 850 revolutions per minute.

To plane 28 inches wide by 10 inches thick, weight 10,400 pounds.

To plane 30 inches wide by 12 inches thick, weight 14,000 pounds.

FIG. 1726.



COLUMBIAN SIX ROLL RAPID FEED DOUBLE SURFACER AND MATCHER,

WITH BROKEN FEED ROLL AND BROKEN PRESSURE BARS.

Columbian 26 inch, Six Roll Rapid Feed Double Surfacer and Matcher with sectional in-feeding rolls and chip breakers; pressure bars and chip breakers adjustable to and from the knives; all feed rolls geared at both ends, four-slotted solid steel forged top and bottom cylinders, belted at both ends; Shimer patent matcher heads with one set of flooring cutters, four plain knives for the top cylinder, two plain knives for the bottom cylinder, one set (2) four slotted jointing heads 6 inches long, with one set (4) jointing knives, two sets (4) beading bits and four wrenches. To plane 26 inches wide both sides, 6 inches thick, match 26 inches wide and under, feed rolls and both cylinders 6½ inches diameter, cylinder bearings, 2 inches diameter 10 inches long. Price, \$1600.00.

Columbian 26 inch, Six Roll Rapid Feed Single Surfacer and Matcher, complete as above, omitting the under cylinder and the attachments belonging to it.

Price, \$1450.00.

Columbian 24 inch, Six Roll Rapid Feed Single Surfacer and Matcher, to plane 24 inches wide, 6 inches thick, and match 24 inches and under, including all the attachments described above with the 26 inch double surfacer and matcher. Price, \$1450.00.

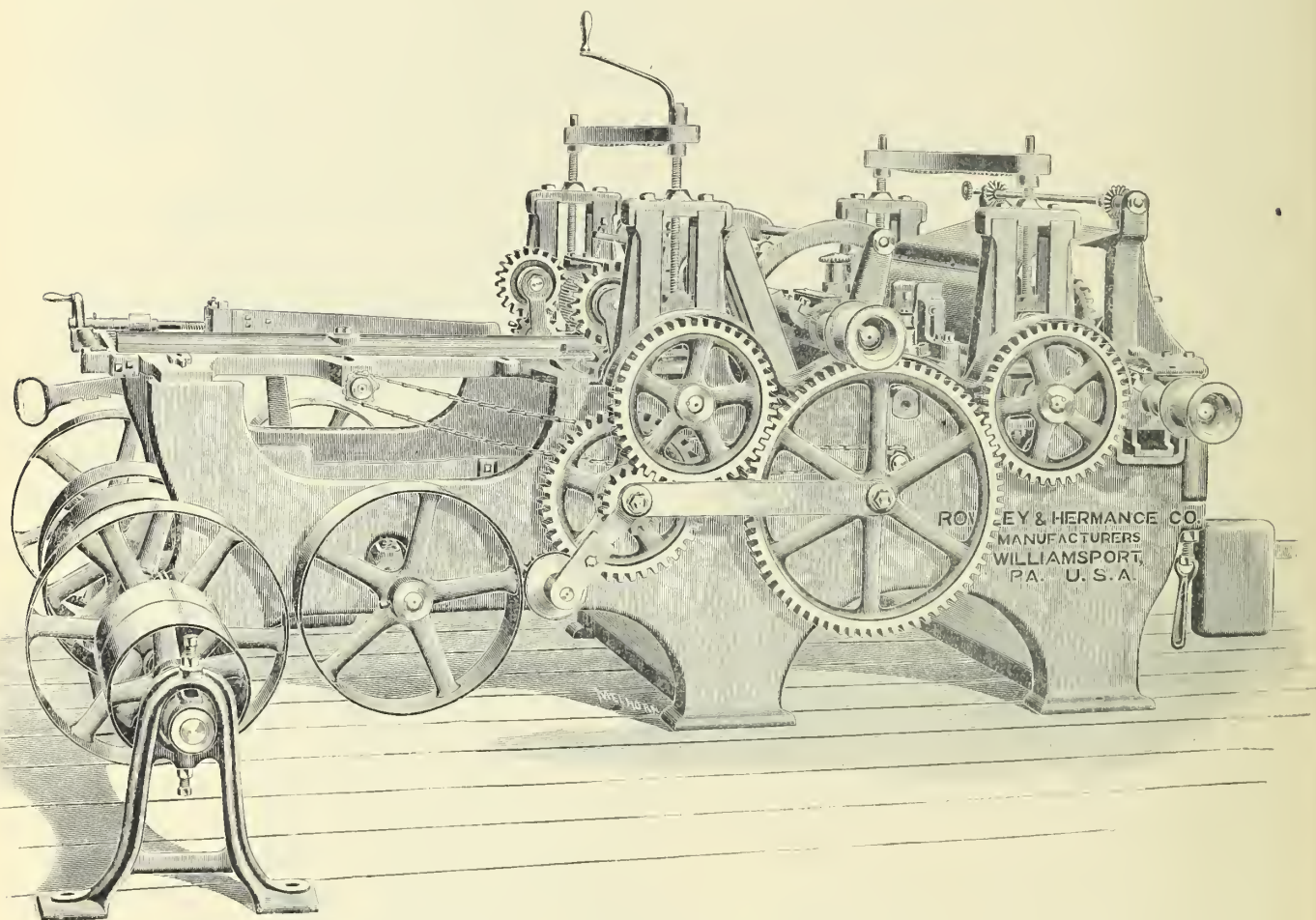
Columbian 24 inch, Six Roll Rapid Feed Single Surfacer and Matcher, to plane one side 24 inches wide, 6 inches thick, and match 24 inches wide and under, complete with all the attachments described with the 26 inch double surfacer, except the under cylinder and the attachments belonging to it. Price, \$1350.00.

Columbian 14 inch, Six Roll Rapid Feed Double Surfacer and Matcher with solid rolls, to plane two sides 14 inches wide, 6 inches thick, and match 14 inches wide; complete with four slotted solid steel forged top and bottom heads, Shimer patent matcher heads with one set of flooring cutters, four 14 inch plain knives for the top head and two for the bottom head, one set (2) four slotted jointing heads 6 inches long, with one set (4) jointing knives, two sets (4) beading bits and four wrenches. Price, \$1250.00.

Columbian 14 inch, Six Roll Rapid Feed Single Surfacer and Matcher with solid rolls, to plane one side 14 inches wide, 6 inches thick, and match 14 inches wide; including the attachments described above with the 14 inch double surfacer, omitting the under cylinder and the attachments belonging to it. Price, \$1150.00.

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FIG. 1727.



PORTLAND FOUR ROLL DOUBLE SURFACER AND MATCHER.

VIEW OF GEARED SIDE.

PORTLAND 24 inch Four Roll Double Surfacacer and Matcher, to plane two sides 24 inches wide, $6\frac{1}{2}$ inches thick, and match 24 inches wide and under, complete with forged solid steel top and bottom cylinders slotted on four sides, with long journals, pressure bars and chip-breakers adjustable to and from the knives, solid in-feeding rolls, top rolls and cylinder to raise and lower $6\frac{1}{2}$ inches, bed stationary, cylinders and rolls each $5\frac{1}{2}$ inches diameter, cylinders belted at both ends; matcher heads adjustable the full width of the machine to admit of changing position as the knives on the main cylinders become dull; complete with two 24 inch plain knives for the top and two for the bottom cylinders, one set (2) Shimer patent matcher heads with one set of flooring cutters, one set (2) slotted jointing heads with one set (4) jointing knives, one set (2) beading bits, one set (2) novelty siding knives and five wrenches. Price, \$750.00.

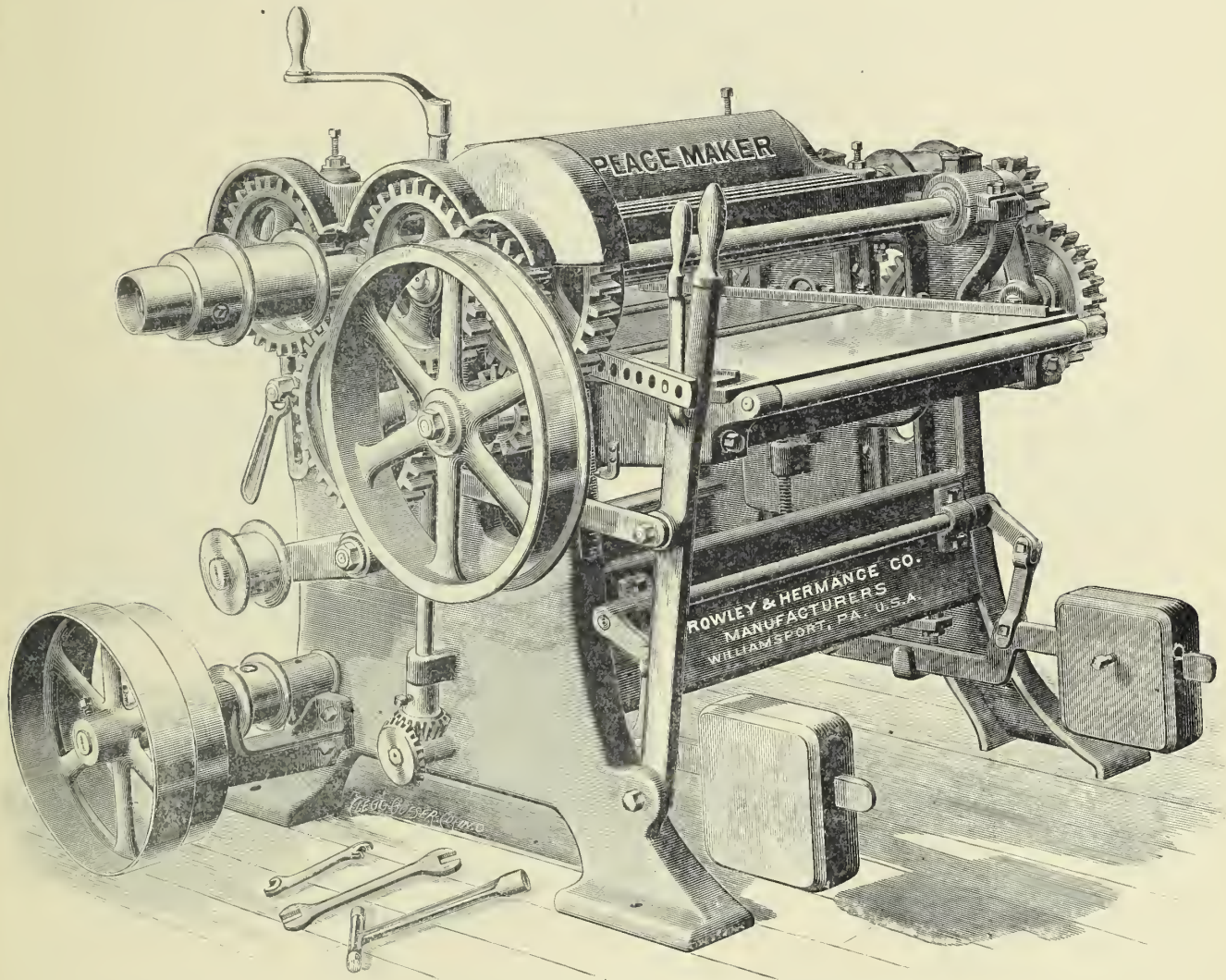
Portland 24 inch Four Roll Single Surfacacer and Matcher, complete as described above for the 24 inch double surfacer and matcher, omitting the under cylinder and the attachments belonging to it. Price, \$650.00.

Portland 24 inch Four Roll Double Surfacacer only, to plane two sides 24 inches wide and $6\frac{1}{2}$ inches thick, complete with two 24 inch plain knives for the top and two for the bottom cylinders. Price, \$600.00.

Portland 24 inch Four Roll Single Surfacacer only, to plane one side 24 inches wide, complete with two plain knives for the top cylinder. Price, \$500.00.

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FIG. 1729.



PEACE-MAKER DOUBLE BELTED SINGLE SURFACER.

THIS cut illustrates our new Double Belted Single Surfacer, to plane from $\frac{1}{8}$ of an inch to 8 inches thick and 26 inches wide. It is a heavy, strong and compact machine of new design, for doing smooth and rapid work in planing mills, jobbing shops, casket, furniture and carriage factories, etc., and has many new and valuable features.

The cylinder is made of solid forged steel with long bearings of large diameter, and belted at both ends. The bearings are carefully fitted and the boxes scraped to them. The bed is very rigid, solidly ribbed under the cylinder and gibbed in the slides to take up lost motion, and by our new device can be quickly and securely clamped to the frame, making it as solid as the frame itself. The chip-breaker and pressure bars are carefully and accurately fitted. The chip-breaker rises and falls with the in-feeding roll. Both the chip-breaker and pressure bar work close to the knives and are adjustable to the lumber independent of each other and the feed rolls. The feed works are very strong and the gearing extra heavy. The rolls are set as close to the cylinder as possible and are all driven. The upper in-feeding roll, which is a fluted roll, is weighted; and being connected with our improved compensating weight levers, equal pressure is secured on the lumber the entire width of the machine. This roll is adjustable for light or heavy cut. The gears are made from iron cut patterns, and all adjustable gears are bushed with brass, and travel together so as to be in uniform mesh and not ride on the points of the teeth, making a very positive and powerful feed. The feed is started and stopped by a belt tightener placed convenient to the operator. It has two rates of feed: 45 and 64 lineal feet per minute.

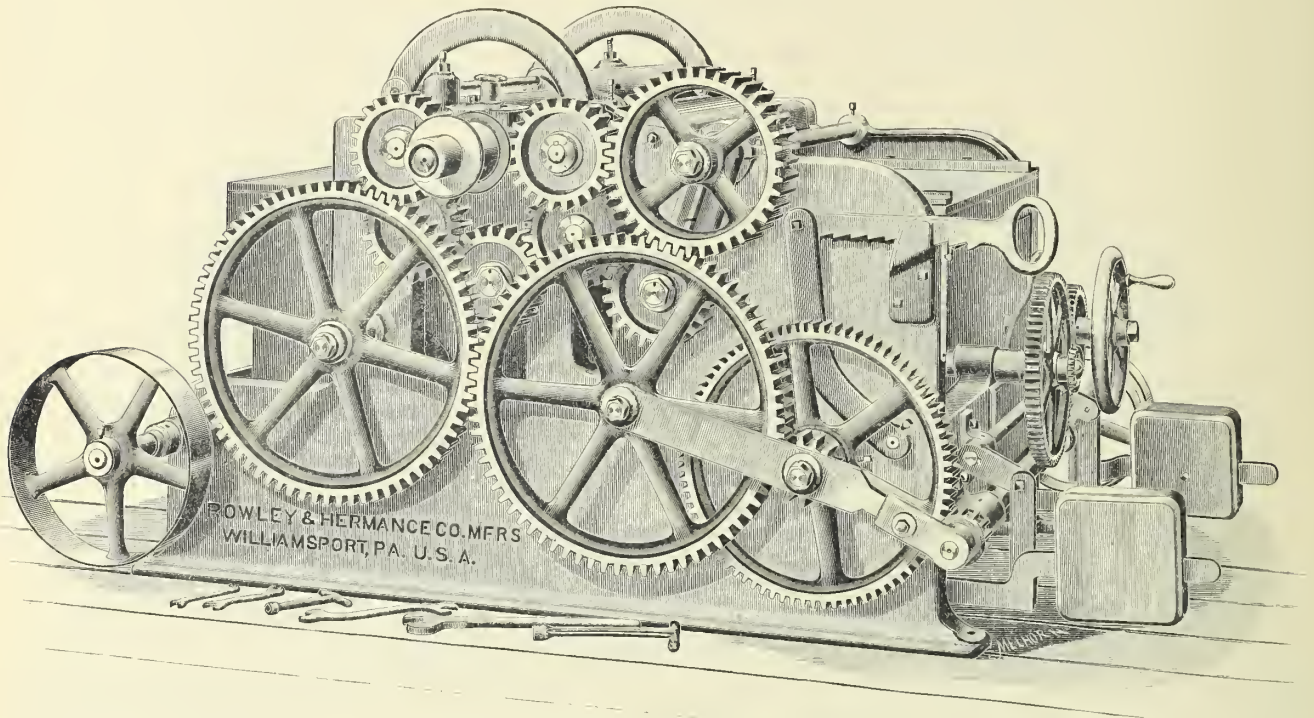
We build this machine either single or double, as required, and furnish a countershaft with each machine.

Peace-Maker 26-inch Double Surfacer, to plane two sides 26 inches wide, 8 inches thick; complete with one set of plain knives, three wrenches and countershaft. Price, \$450.00.

Peace-Maker 26-inch Single Surfacer, to plane one side 26 inches wide, 8 inches thick; complete with one set of knives, three wrenches and countershaft. Price, \$375.00.

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FIG. 1729.



EXTRA HEAVY CABINET PLANER.

THE above cut illustrates our new improved twenty-six inch Extra Heavy Single Cabinet Planer, for use in planing mills, furniture factories, etc., etc., and is especially recommended for surfacing rough hardwood and yellow pine lumber, producing a uniform and very smooth surface. The frame is very heavy and is absolutely rigid against the strain put upon it by the working parts, as the cut plainly shows.

The table frame is a heavy casting in one piece, and rests upon inclined planes or sliding wedges, making the most solid support known for holding lumber to planer knives.

The wedges are moved by a hand wheel conveniently located, one turn of which raises the table one-sixteenth inch.

The cylinder is of forged steel, with long and heavy journals running in genuine Babbitt lined boxes, and has ample belt power for any duty, and is belted at both ends.

The feed rolls are five inches diameter and are operated by a train of heavy gearing, which makes them positive and powerful, and the mesh of the gears is not in the least affected by heavy cuts or by raising or lowering the table. All rolls are geared and the connections are strong and durable.

The chip-breaker is very close to the cutting edge of the knives and moves in a circle, the center of which is the center of the cylinder, so the same relative position is always secured, preventing clipping of ends.

This machine has many other new and important features not enumerated above, which make it the best machine of its class in the market. It will plane one-sixteenth to eight inches thick, and has two rates of feed, viz.: 30 and 40 lineal feet per minute.

The countershaft has tight and loose pulleys 12 inches diameter by 7 inch face, and should run 800 revolutions per minute.

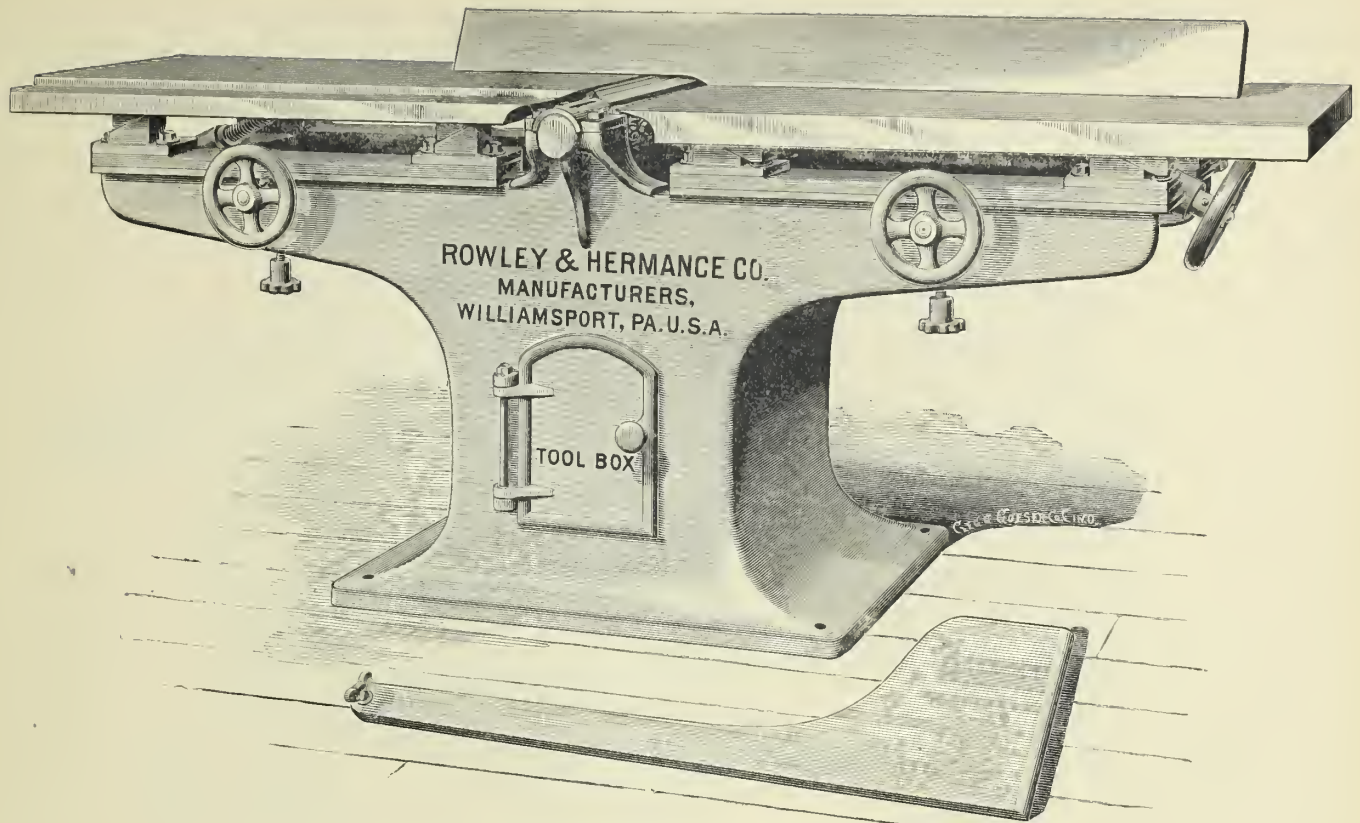
Pulleys on cylinder, 4½ inches diameter by 5 inch face; speed of cylinder, 4250 revolutions.

Built in four sizes, to work 24, 26, 28 and 30 inches wide.

Extra heavy single furniture or cabinet planer, with bed to raise and lower on inclines, forged solid steel cylinders, with long heavy journals, belted at both ends, four powerfully geared feed rolls; complete with one set (2) knives and one countershaft; built in four sizes as follows:

To plane one side 24 inches wide, 1-16 to 8 inches thick,		\$500 00
To plane one side 26 inches wide, 1-16 to 8 inches thick,	- - - - -	520 00
To plane one side 28 inches wide, 1-16 to 8 inches thick,	- - - - -	540 00
To plane one side 30 inches wide, 1-16 to 8 inches thick,	- - - - -	560 00

FIG. 1730.



IMPROVED HAND JOINTER OR BUZZ PLANER.

THIS machine is capable of a large variety of work, such as planing out of wind, cornering, beveling, rabbeting, chamfering squaring-up, making glue joints, etc., making it indispensable in sash and door, agricultural implement, furniture, car works, pattern shops and other wood-working establishments. The frame is cast in one piece, making it strong and substantial. The tables are seven feet long. Each table has an independent vertical adjustment, operated by hand wheels, shown at each end of machine, also an independent lateral adjustment of seven inches, shown in small view, to and from the path of the cutters, operated by hand wheels, shown on the front or working side of the machine. This unusual space (14 inches) allows free access to the cylinder, and will be appreciated by mechanics. Our improved dovetailed incline adjustment for raising and lowering the tables makes it almost impossible to get the tables out of position, and if once out can be readjusted in two minutes. This is a great improvement over any other machine of this kind.

The cylinder is made of solid forged steel, small in diameter, so it can be run at a high speed, which is very essential for doing smooth work on brash or cross-grained lumber. It is provided with bolts on two sides for carrying straight knives, and slotted on the other two sides for carrying rabbeting and other odd knives. It is provided with an adjustable gauge, which can be set square or at any desired bevel, also wooden safety guard to prevent accidents to the fingers of the operator.

We furnish with each machine one countershaft, one set (2) straight knives for the cylinder and necessary wrenches.

DIRECTIONS.

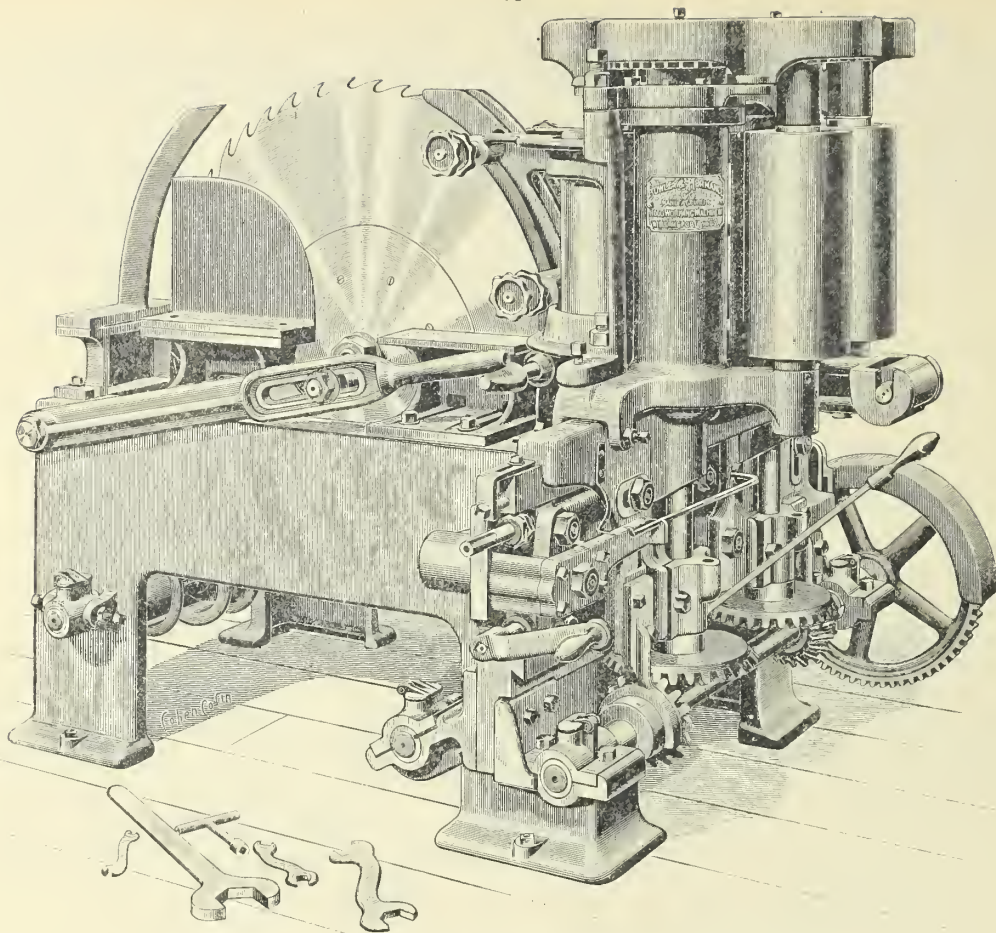
Never screw or fasten the machine to the floor. The tables should be set level to do perfect work. Level the planer by putting thin wedges under the base of machine. The belt on the cylinder should be endless, light and of even thickness, without hooks, rivets or lacers. The laps should be cemented, and it will last longer, cylinder will run better, and do smoother work.

Belts for the 8, 12 and 16 inch machines should be $3\frac{1}{2}$ inches wide; on the 24 and 30 inch machines 4 inches wide.

Tight and loose pulleys, 8 inches in diameter by 4 inch face, and should run 780 revolutions per minute.

New pattern Improved Hand Jointer or Buzz Planer, tables 7 feet long, opening 14 inches, and raise and lower on dovetail inclines; complete with countershaft, two plain knives, adjustable bevel gauge and wooden safety guard. Built in the following sizes:

To plane 8 inches wide,	-	-	-	-	-	-	-	-	-	\$135.00
To plane 12 inches wide,	-	-	-	-	-	-	-	-	-	165.00
To plane 16 inches wide,	-	-	-	-	-	-	-	-	-	185.00
To plane 24 inches wide,	-	-	-	-	-	-	-	-	-	220.00
Extra for steel lips on tables:										
For the 8 and 12 inch machines,	-	-	-	-	-	-	-	-	-	6.00
For the 16 inch machines,	-	-	-	-	-	-	-	-	-	8.00
For the 24 inch machines,	-	-	-	-	-	-	-	-	-	10.00



IMPROVED NEW CHAMPION RE-SAWING MACHINE.

THE above cut represents 38 inch New Champion Re-Sawing Machine. The frame is very heavy. It is cast in one piece and is especially designed to rigidly support the working parts. The arbor is made of steel and is heavy. It overhangs the box next to the saw, which admits of the saw being easily removed. The saw arbor boxes are connected by a heavy yoke and gibbed to the frame, and are moved to and from the rolls by means of a screw, keeping the saw always in line with them. The rolls move upon the platen in pairs, and readily adjust themselves to unequal thicknesses of lumber, and are perfectly self-centering. They open 6 inches, and a 1-inch board may be cut from a 4 inch plank. One pair of rolls may be made stationary, and lumber of even thickness cut upon that side, and all inequalities in thickness be confined to the other side. The table upon which the lumber rests is very close to the rolls, which admits the sawing of narrow boards. The lumber is guided by adjustable arms on each side of the saw; both arms are fitted with springs and may be swung entirely free of the saw by simply removing a pin. The feed works are strong and reversible, and by a slight movement of the lever shown at front of machine, the lumber may be run from the saw more rapidly than it is fed to the saw. The feeding gears are large, strong and not liable to wear out nor break by hard service. The platen that supports the rolls turns upon a centre for sawing beveled sidings, etc., and is regulated by a graduated index plate, which can be conveniently seen by the operator. By means of a novel attachment the saw may be easily lifted out of the frame and kept suspended on a pin in the centre, thus avoiding the bending and twisting of the teeth which often occurs when the saw is rolled out in the usual way, as the teeth are very thin and saw heavy. The saws are furnished either segment or solid plate, and are ground taper to No. 16 gauge unless otherwise ordered. The segment saw of large size will not buckle when hot, as the joints permit the expansion of the metal, and will cut picture frame backing as well as the thickest plank. The saw is filed and set, and the machine is thoroughly tested before leaving the works, and is guaranteed to give entire satisfaction.

CIRCULAR RE-SAWS.

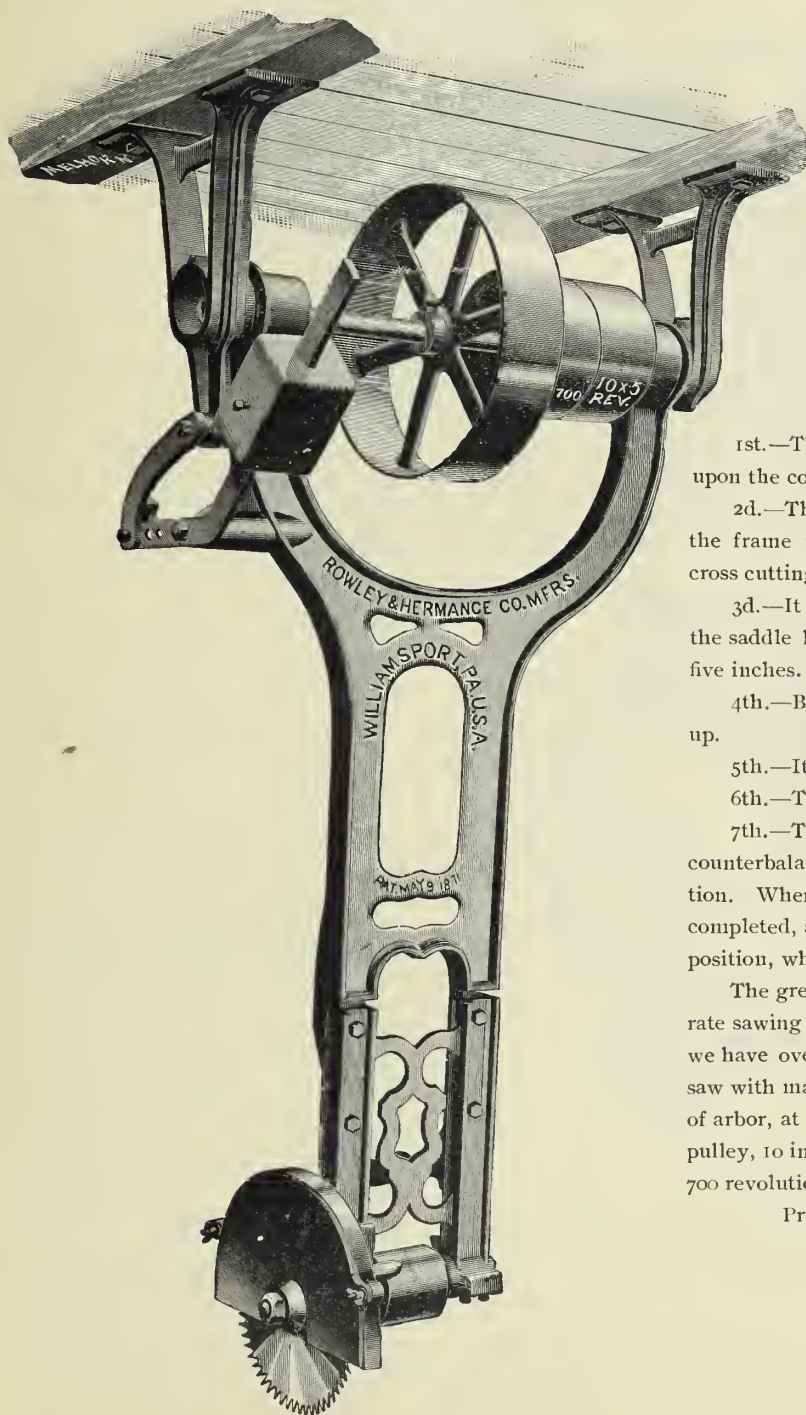
Made in the following sizes:

Size of Saw.	Width of Cut.	Size of Pulley on Mandrel.	Speed of Mandrel.	Cubic Measurements.	Approximate Weight.	Average H.-P. Required.	Price.
60-inch Segment Saw,	27 inches.	24 x 12	650	200	5500	12 to 15	\$1050 00
54-inch " "	25 "	20 x 10	700	190	5000	12 " 15	900 00
50-inch " "	22 "	18 x 10	750	185	4600	10 " 12	800 00
44-inch " "	20 "	18 x 10	850	175	4200	10 " 12	700 00
42-inch " "	19 "	18 x 10	850	170	3900	9 " 10	675 00
42-inch Solid Plate Saw,	19 "	18 x 10	850	170	3900	9 " 10	575 00
38-inch Segment Saw,	17 "	14 x 8	950	132	3700	8 " 10	575 00
38-inch Solid Plate Saw,	17 "	14 x 8	950	132	3700	8 " 10	500 00
34-inch Segment Saw,	15 "	14 x 8	1050	120	3400	6 " 9	525 00
34-inch Solid Plate Saw,	15 "	14 x 8	1050	120	3400	6 " 9	450 00
30-inch " "	13 "	12 x 8	1200	112	3200	4 " 8	400 00
24-inch " "	10 "	8 x 6	1500	80	2000	4 " 6	300 00

Countershaft for either of the Re-Sawing Machines. If wanted, extra, \$35.00 to \$45.00.

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FIG. 1732.



IMPROVED NEW PATENT SWING CUT-OFF SAW.

THIS machine is entirely new, and has the following advantages over any other swing saws made.

1st.—The frame swings upon the hangers, instead of upon the countershaft, as in other machines.

2d.—The hub on the hanger is turned, and the top of the frame is Babbitted to fit, thereby securing accurate cross cutting.

3d.—It is adjustable for different heights of ceiling, as the saddle holding the arbor has a sliding adjustment of five inches.

4th.—Being adjustable, the saw can be used entirely up.

5th.—It has our patent sliding cap box.

6th.—The saw is protected by a shield.

7th.—The machine is also provided with an improved counterbalance, which holds the saw in any desired position. When the saw has been drawn forward and the cut completed, a slight push returns the frame to its normal position, where it will remain, as shown in cut.

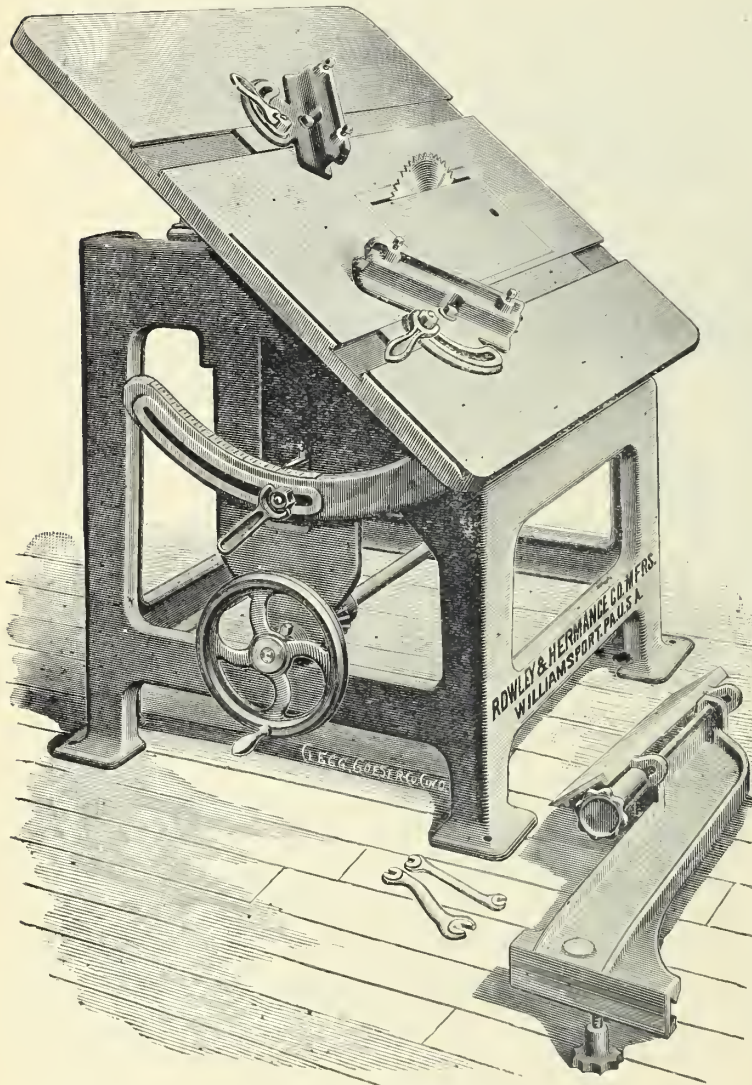
The great objection to swing saws has been that accurate sawing was impossible. With the above arrangement we have overcome the difficulty. We furnish one 14 inch saw with machine. Distance from base of hanger to center of arbor, at highest point, 6 feet 7 inches. Tight and loose pulley, 10 inches diameter by 5 inch face, and should make 700 revolutions per minute.

Price, - - - - \$75.00

PRENTISS TOOL & SUPPLY CO.

FIG. 1733.

ADJUSTABLE SAW TABLE.



THIS machine has a heavy, substantial frame, cast in one piece, which makes it very rigid.

It has an iron table, arranged to work straight or on a bevel, which raises and lowers in a direct line on gibbed slides by simply turning the large hand wheel shown on the front of the machine; and the slides have an adjustment for taking up any wear that may occur at this point. It tilts on large circles to 45 degrees, and is easily and quickly tilted by loosening one nut; and when it is set it is rigidly held in place.

The arbor is placed in the frame and held by solid cap boxes, which hold it firmly in position, thus allowing perfect work to be done in mitering and dadoing.

It is also provided with a degree index plate, shown on the circle in front of the machine, for setting the table at any angle with the saw.

The machine is fitted with adjustable cut off and combined rip and bevel gauges. The cut-off gauges can be adjusted to 45 degrees in either direction, and can be used on either or both sides of the saw. They are all slotted to receive wooden gauges of any length. The combined rip and bevel gauge is adjustable for straight or bevel sawing.

Dadoing, grooving, jointing, moulding and rabbeting heads can be used on this machine if it is desired.

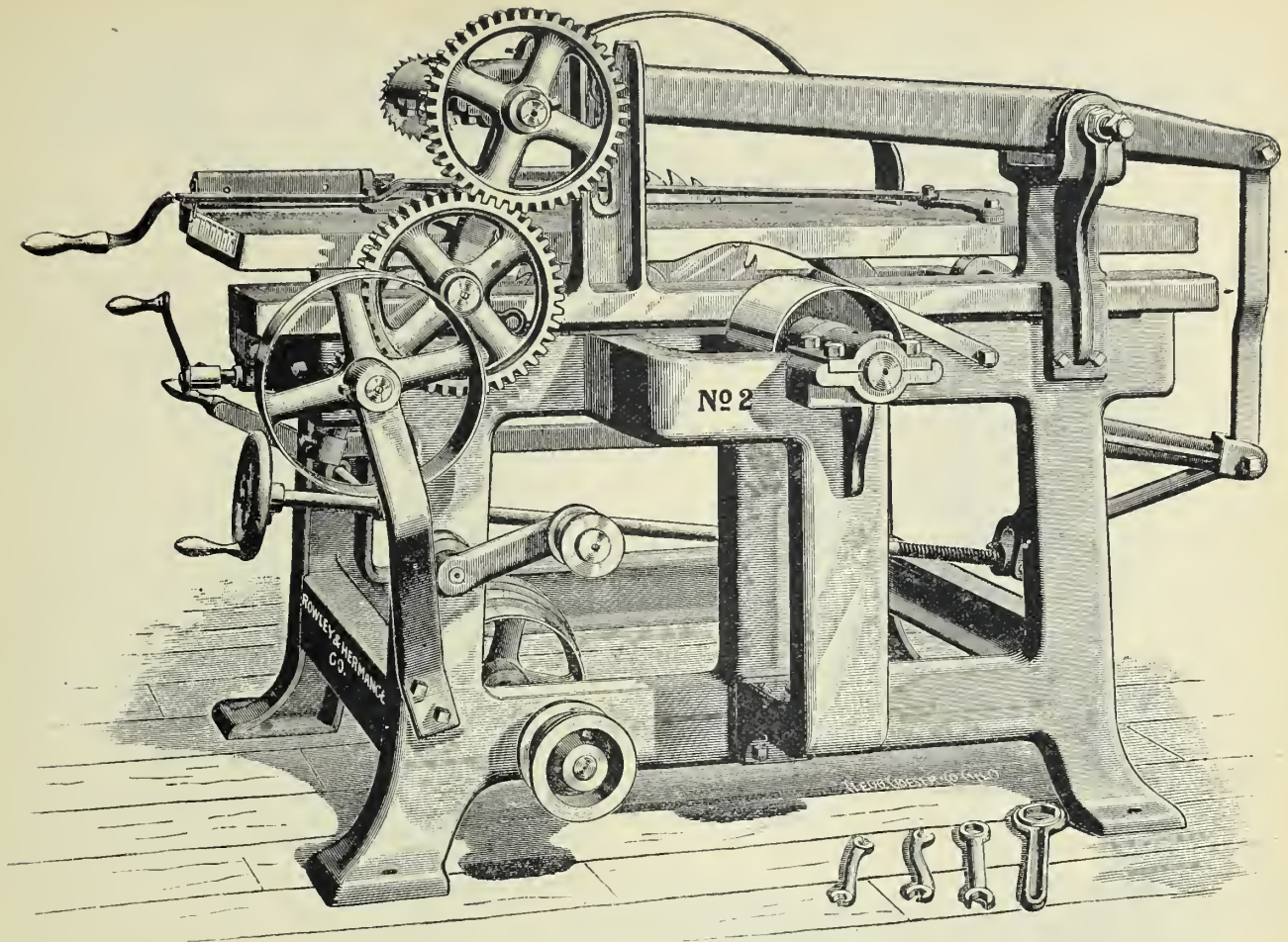
The large throat plate in the center of the table can be quickly removed to facilitate changing the head or saw. Wooden throat plates can be used if desired.

All parts are accurately fitted, and adjustments true and square, so that a fine joint can be made without subsequent hand fitting. We furnish with each machine two adjustable cut-off gauges, one combined adjustable rip and bevel gauge, one 12 inch cross-cut saw, one 12 inch rip saw, two

wrenches and a countershaft. This table is 36 inches wide by 39 inches long. Pulley on the arbor is 4 inches in diameter by 5 inches face, and should run 3,000 revolutions per minute. The tight and loose pulleys on the countershaft are 10x5, and should run 600 revolutions per minute.

Adjustable saw table with iron top, arranged to work straight or on a bevel, provided with degree index plate for setting the table at any angle with the saw, complete with two adjustable cut-off gauges, one combined adjustable rip and bevel gauge, one 12 inch cross-cut and one 12 inch rip saw, two wrenches and countershaft, without dado-head. Will saw 15 inches wide. Price, \$135.00.

The same machine, with patent expanding dado-head and five sets of cutters. Price, \$160.00.



PATENTED JULY 18TH, 1893.

NEW HEAVY PATTERN IMPROVED No. 2 LIGHTNING SELF-FEEDING RIP SAW TABLE.

WITH IRON TABLE, OUTSIDE BEARING AND IMPROVED TABLE RAISING DEVICE.

THE accompanying engraving represents the New Improved Heavy No. 2 Lightning Self-Feeding Rip Saw Table, adapted to all kinds of ripping and suited to a great variety of work.

The iron frame is cast in one piece, very heavy and strong, with a substantial outside bearing for the saw arbor, strongly braced to the side and the bottom of the frame.

The table is iron, 3 feet 8 inches wide, by 5 feet 2 inches long, with an opening around the saw, into which an iron plate is accurately fitted, which is taken out when saws are to be changed, thus avoiding lifting up the table.

The iron table is raised or lowered vertically by our Improved Patent Table Raising Device, with a crank at the front end, as shown in the cut. The table is provided with two long idle rolls, which relieve it from friction and wear.

The feed works are powerful and reliable, capable of doing rapid work, and are started and stopped by a tightener. The feed roll marks are taken out by the saw, leaving no mark on the lumber.

It is the strongest feeding machine on the market. There are three rates of feed, slow, medium and fast, 72, 132 and 190 lineal feet per minute respectively.

The method of changing from self-feed to hand-feed by means of a hand wheel, shown at front of machine, is simple, rapid and easy; and the feed arm is self adjusting for irregularities in thickness of lumber.

The patent setting device for adjusting the gauge, is entirely new and novel. The gauge can be set at any mark on the index plate, or at any fraction of an inch, and by a slight movement of the lever is locked rigidly in position.

A shield covers the saw when in operation, and the table is supplied with a spreader, making it absolutely impossible for a board or short pieces to be caught and thrown over the saw, thus avoiding accidents from that cause.

This machine is particularly adapted for ripping boards, planks, moulding and general planing mill work. It will rip up to 18 inches wide and 8 inches thick. An attachment for sawing straight or bevel siding is furnished at extra cost if desired.

A 24-inch saw can be used, but one 18-inch saw only, with one feed saw and the necessary wrenches, are furnished with each machine regularly. Two or more saws can be used at one time if so desired, by having extra collars for the saw arbor and feed arbor. We guarantee this machine to be the best self feed rip saw table on the market, and only ask its trial beside any other make of similar machine for 30 days.

Weight, 1800 pounds.

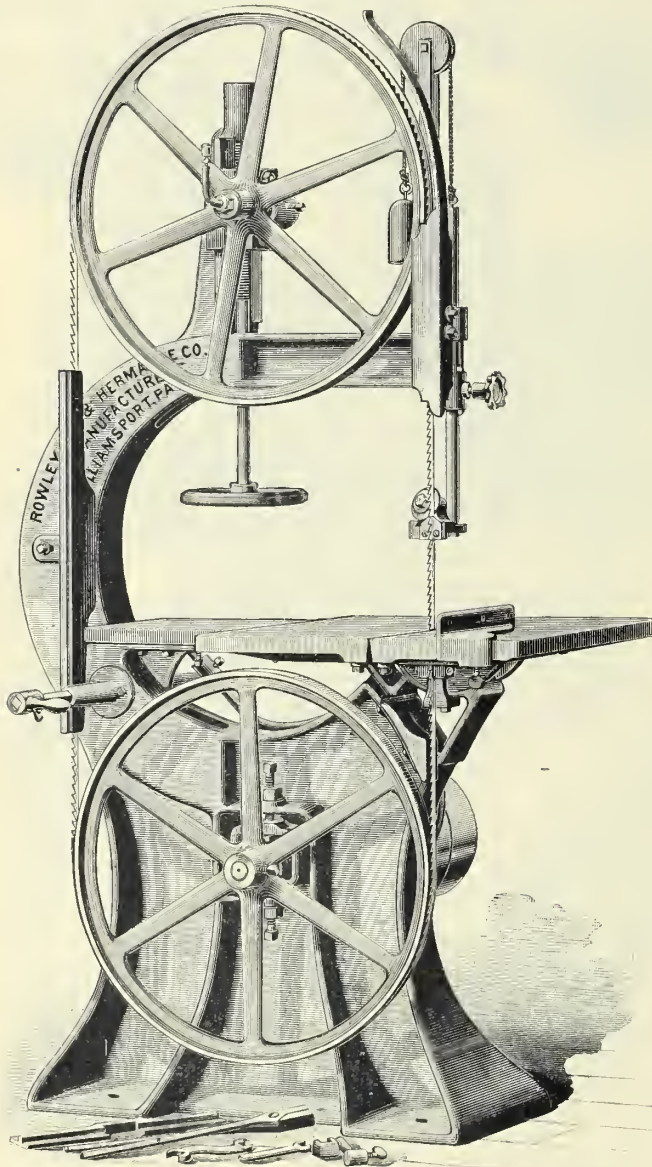
This machine can be built as a right or left-hand machine, but is always furnished as a right-hand machine unless otherwise ordered. Size of pulley on arbor, 8 x 8, and should run 2,000 revolutions per minute.

Countershaft furnished at extra cost when ordered, with tight and loose pulleys, 12 x 8, and should run 700 revolutions per minute.

Price, without countershaft, \$230.00. Countershaft, \$35.00.

PRENTISS TOOL & SUPPLY CO.

FIG. 1735.



No. 1.

Improved No. 1 Band Saw with 36-inch wheels, iron tilting table, parallel slitting gauge, scarfing frame, one pair of soldering tongs, one $\frac{1}{2}$ -inch saw blade and the necessary wrenches, \$175.00.

No. 2 Band Saw with 32-inch wheels, iron tilting table, including the same attachments described with the No. 1 machine, \$140.00.

No. 2 Band Saw with 32-inch wheels, stationary wood table glued up in strips, including the attachments described for the No. 1 machine, \$120.00.

The No. 2 Band Saw is not shown in catalogue.

NEW PATTERN No. 1 BAND SAW.

WE recommend this machine for agricultural, bracket, cabinet, car, carpenter, carriage, chair, organ, piano, sash and door, wagon, pattern and job shops, planing mills, etc. It works equally well in hard or soft wood, and will carry blades up to $1\frac{1}{2}$ inches in width.

The main frame is cored out and cast in one piece, well proportioned with a good solid base, and of great strength.

The wheels are 36-inch diameter, with $1\frac{1}{2}$ inch face, light, strong and carefully balanced. They are covered with pure para rubber, securely cemented and ground perfectly true. They are provided with vertical, horizontal and angular adjustments, by which the saw can always be made to run accurately on any portion of their faces.

All the adjustable parts of the machine are carefully and accurately fitted. The raising screw has square thread, and is much less liable to bind and wear than the V thread used on other makes of similar machines. A steel compensating spring is provided to allow for the contraction and expansion of the saw, thus avoiding the breakage of saws.

The table is made of iron or of wood, as ordered, and is adjustable to any angle not exceeding 45° . It is provided with an improved belt shifter, placed convenient to the operator. The driving shaft and guide rod are of the best crucible steel. The guide rod being of steel, instead of iron used in other makes of Band Sawing Machines, is much stiffer and admits of the saw being held more rigid.

Saws from 17 feet to 18 feet 6 inches long can be operated. The machine will cut 18 inches thick, and being $33\frac{1}{2}$ inches from blade to frame, will swing a circle of 67 inches.

We furnish a parallel slitting gauge, scarfing frame, one pair soldering tongs, one $\frac{1}{2}$ -inch saw blade and the necessary wrenches with each machine.

Each machine is tested on actual work before it leaves the factory, and we warrant entire satisfaction on a trial of thirty days.

Tight and loose pulleys, 12 inches diameter by 4 inches face, and should run 350 revolutions per minute.

Weight, 1,500 pounds.

IMPROVED KEYSTONE SCROLL SAW.

THIS cut represents the improved Keystone Scroll Saw, which is intended for furniture, sash, door and blind factories, piano, carriage and pattern shops, etc., etc.

The frame is cast in one piece, making a very solid base, which allows a high rate of speed without jar or trembling.

The strain is the best on the market, arranged to produce an unusually even tension, admitting of high speed, and can be raised or lowered for any thickness up to 12 inches.

The operator can change the rake of the saw while in motion, by hand wheel under the table; which cannot be done on any other make of scroll saw.

There is no friction on the strain, and the lightness of the pitman and cross head prevents any perceptible jar when running at the highest rate of speed.

Changing from inside to outside work is instantaneous. The saw is passed through the table and slides into the cross-head, which it cannot miss catching.

An important feature is the adjustment of the box on the lower end of the pitman, which can be adjusted up until the box is worn out. A new box can be substituted in a few minutes, saving the cost of a pitman.

The machine has a combined brake and shifter, operated by hand lever convenient to the operator. It has great force and will stop the machine instantly.

The top is of hard wood strips glued together.

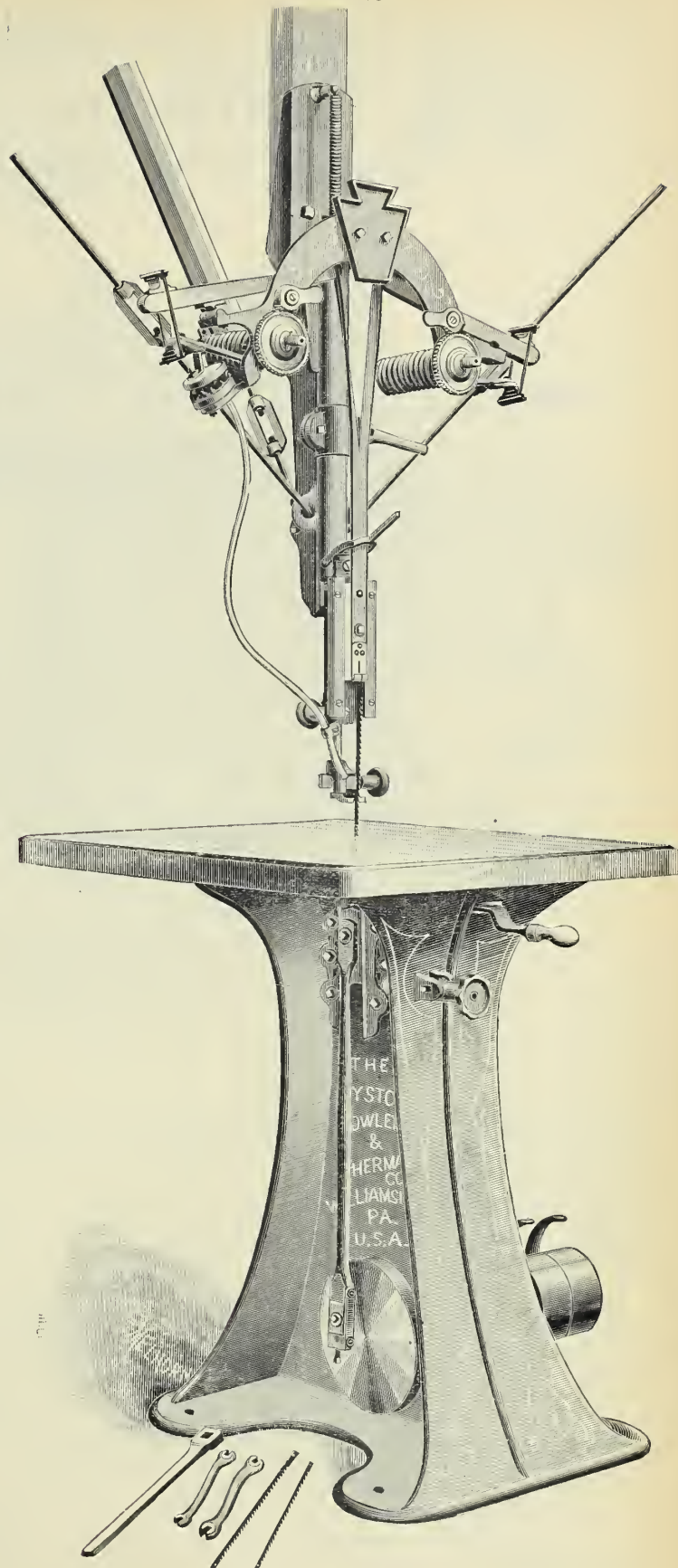
It carries its own countershaft running in our patent three-part journal box, which causes it to run very steadily. In fact, it has all the good points of the best machines, together with our improvements, making it the best scroll saw on the market.

Every machine is thoroughly tested on actual work before leaving our factory, and warranted to give satisfaction.

The stroke is 5 inches. Tight and loose pulleys are 6 inches in diameter \times 2½ inch face, and should run 800 revolutions per minute.

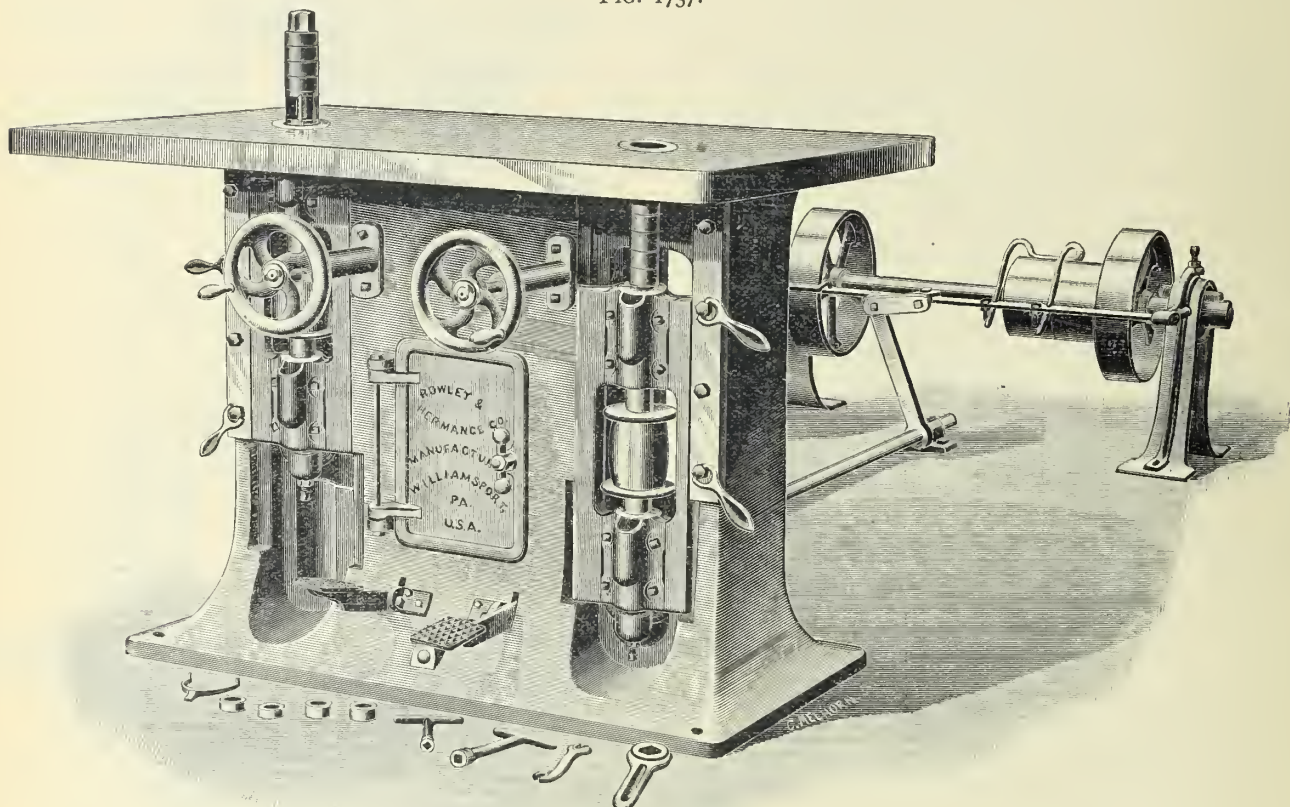
Keystone Improved Scroll Saw, with spiral spring top strain, air pump, combined brake and shifter, stationary hard wood top, three saws (one each, ¼ inch, ⅜ inch and ½ inch), and two wrenches. Price, \$110.00.

The same machine, with stationary iron top in place of wood top. Price, \$120.00.



PRENTISS TOOL & SUPPLY CO.

FIG. 1737.



NEW PATTERN TWO-SPINDLE EDGE MOULDER AND SHAPER.

A STRONG, durable machine of excellent design, with points of superiority over any other machine of its kind yet produced. The frame is heavy, cored out and cast in one piece, making it very rigid. It extends beyond the headstocks that carry the spindles, allowing sufficient space for the belts to pass through. A closet within the frame provides a convenient place for collars, knives and wrenches.

The spindles are of the best steel, $1\frac{1}{8}$ inches in diameter, 26 inches between centers, perfectly balanced, and run in long self-oiling bearings, with V grooves in ends, and rest on adjustable copper steps, encased in oil to prevent heating, and are raised or lowered with hand wheels convenient to the operator.

Either spindle can be dropped below the surface of the table.

The spindles can be made to receive different sized stems if desired, at a slight additional cost.

The headstocks are dovetailed in the frame, and when set in position are held perfectly rigid by an entirely new device, making them as rigid at the frame itself, thus insuring perfectly smooth work.

The table is of iron, very heavy, and planed perfectly true. It can be made of wood if ordered. Wood tables are made of alternate cherry and maple strips glued together, with long bolts passing entirely through the width of the table.

The table is 38 x 50 inches and has brass rings inserted around the spindles.

The countershaft is provided with a belt shifter attached to a rod that passes through the frame, to which is connected a foot treadle so that the operator can shift the belt without leaving his work.

This new feature will be appreciated by practical purchasers.

We furnish with each machine one set of grooved collars, one set of straight knives, spanner and necessary wrenches.

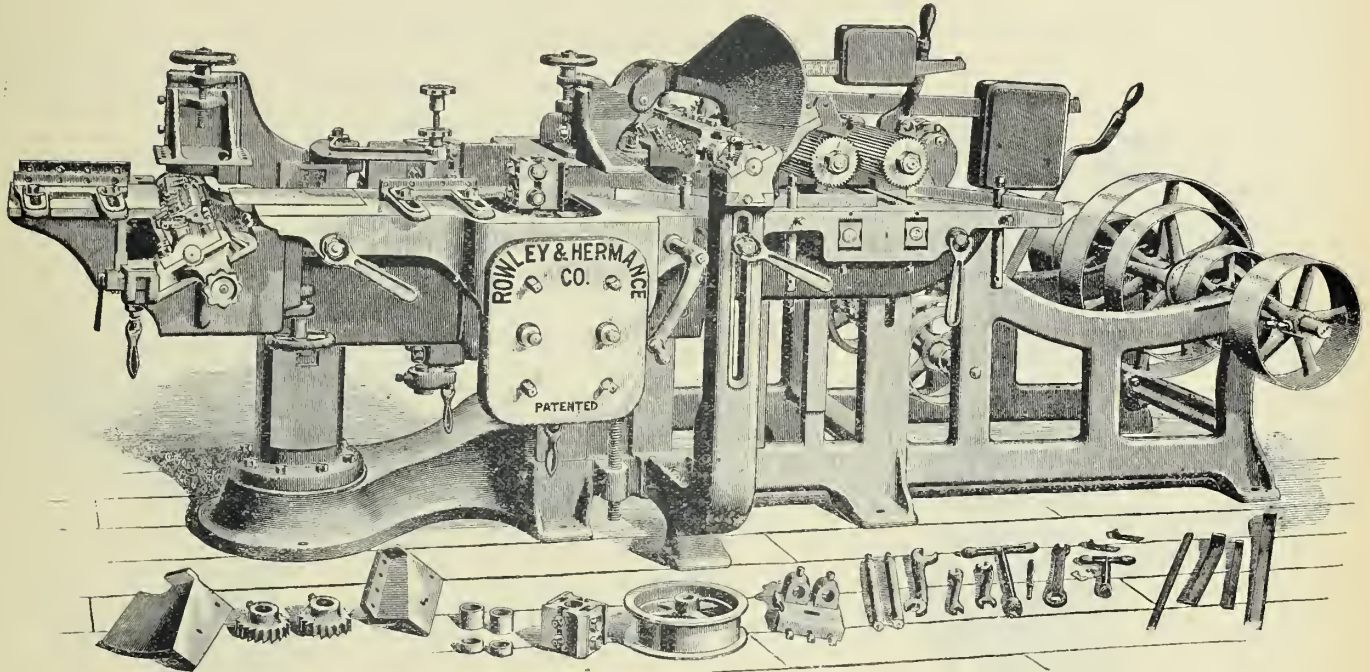
Tight and loose pulleys 8 x 5 inches and should run 950 revolutions per minute.

New Pattern Two-Spindle Edge Moulder and Shaper with iron top and countershaft, one set of grooved steel collars, with one set (4) plain cutters, one spanner and necessary wrenches, including foot treadle for shifting the belt. Price, \$200.00.

The same machine with hard wood top. Price, \$190.00.

PRENTISS TOOL & SUPPLY CO.

FIG. 1738.



PATENTED OCTOBER 10, 1893, JANUARY 23, 1894, JUNE 12, 1894 AND FEB'Y 12, 1895.

NEW COLUMN 10-INCH FOUR-SIDED MOULDER.

ALL ADJUSTMENTS MADE FROM THE FRONT SIDE OF THE MACHINE.

THIS MACHINE has all the strength, durability, improved adjustment, capacity for quantity and quality of work of the larger machines. We call attention to the following special features in this machine, viz.: The heavy outside bearing for the top arbor, which extends to the floor and acts as an extra support. The feed works, the best in use, are started and stopped with a binder. The feed is as perfect when the table is lowered to the full capacity of the machine as when at its highest position. All feed rolls are driven. The top rolls raise parallel with the bed and bear their full weight evenly on all parts of the work, whether narrow or wide, which insures a strong, positive and steady feed at all times. The upper rolls are quickly raised by a lever to admit of placing a form for setting up the machine for different kinds of work. There are four rates of feed, viz.: 20, 31, 38 and 55 lineal feet per minute. The side heads raise and lower with the table. Both the inside and outside spindles are adjustable from the front or working side of the machine while in operation. Either spindle can be set at an angle, and raised or lower, or moved in and out independently of the other without changing the angle. Both of these heads have adjustable chip breakers. An independent adjustment for both of the side spindles, by which the bottom of either spindle is moved in either direction for tipping the head the slightest degree to conform to the pattern. The top head has a lateral adjustment. Bottom head has a lateral and vertical adjustment, and is provided with adjustable chip breakers on both sides. The under head has three bearings, one of them outside of the pulley. The inside head is perfectly free of all encumbrances, and as easy of access as any other head on the machine. Ample space has been allowed about all the heads to admit of using bits for any kind of work. Special attention has been given this feature, as it is necessary, in doing certain kinds of work, to have abundant space for long bits to revolve. It is provided with an adjustable tightener for the belt that drives the top head, by which the slack can be instantly taken up. In running narrow moulding or other light work the strain can be taken off the belt. This is an important feature no other moulder contains. The patent compensating spring is placed under the weight bar to relieve the chip breaker from jar. This is a new and very important feature, as it prevents friction, and in planing roughly sawed or uneven lumber holds the chip breaker firmly upon the material and causes it to ride smoothly over the rough projections, thus avoiding wavy and imperfect work; and the pressure of the chip breaker is always the same. The arbors are of the best steel, unusually heavy, with extraordinarily long bearings. All belts pull on the bottom of the boxes. The table is so securely clamped to the frame by three heavy bolts that it is as solid as the frame itself; and a convenient device is provided for raising and lowering the table. A double spring rest is provided for placing the pressure close to the cutting circle in the rear of top cutter head. It will dress 10 inches wide by $4\frac{1}{2}$ inches thick on four sides, and the table will lower 12 inches. Each machine is furnished with five heads, slotted on four sides, two plain knives for each head, one double spring rest, one extra double flange feed pulley, four collars, two extra pressure shoes, two extra feed spurs and the necessary wrenches and springs as shown in the cut. This machine covers all the advantages contained in other moulders and many improvements that are on no other make of similar machine.

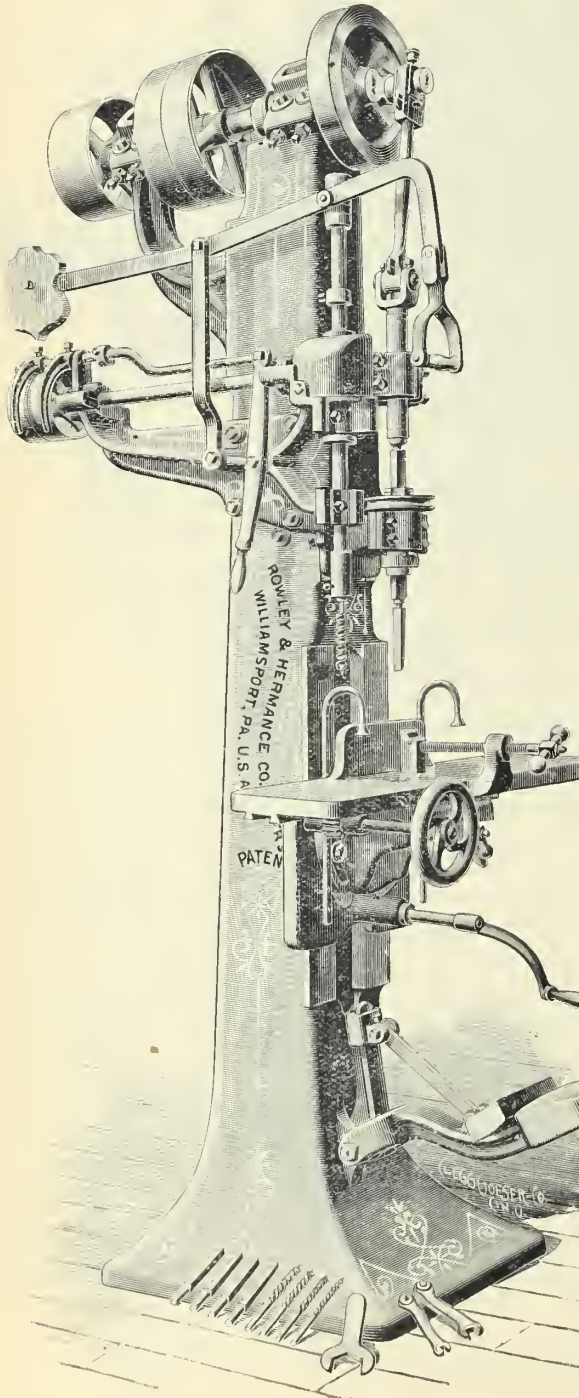
Complete as shown and described to work 4 sides,	- - - - -	\$675 00
Complete as shown and described to work 3 sides,	- - - - -	625 00
Complete as shown and described to work 2 sides,	- - - - -	575 00
Complete as shown and described to work 1 side,	- - - - -	525 00

PRENTISS TOOL & SUPPLY CO.

IMPROVED NEW STYLE No 2 POWER MORTISER,

• WITH BORING ATTACHMENT, CLAMP TABLE AND RACK AND PINION FEED.

FIG. 1739.



THIS machine is principally used on hard wood, and the heavier classes of building material.

It has no superior for furniture, wagon, and agricultural implement factories.

The frame is cast in one solid piece, and extends over the crank shaft, while the caps are placed below, thus the entire strain, or jar, comes upon the frame instead of on the caps of the boxes, as in all other mortisers made. This is a feature worthy of attention.

The clamp table is simple, durable and effective. The piece to be bored or mortised is clamped, and moved forward by the hand wheel which moves the bed and bored, and then run under the chisel and mortised, without releasing it from its position.

The table can be tilted to any angle for radial mortising and will take in a piece 8 inches wide.

The boring attachment is bolted to the side of the frame and driven by gearing. It is provided with a belt shifter for starting or stopping, and can be used or not at will.

It is provided with the belt friction reverse, which reverses the chisel instantaneously, whether working or at rest. This reverse is acknowledged to be the best in use.

We furnish with each machine five mortising chisels and five augers, one each of the following sizes: $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$ inch.

The tight and loose pulleys are 12 inches in diameter by 3 inch face and should run 600 revolutions per minute.

PRICE LIST.

Improved New Style No. 2 Power Mortiser with Boring Attachment, Clamp Table, Rack and Pinion Feed, complete with five chisels and five boring bits, one each of the following sizes: $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$ inch. Price, \$245.00.

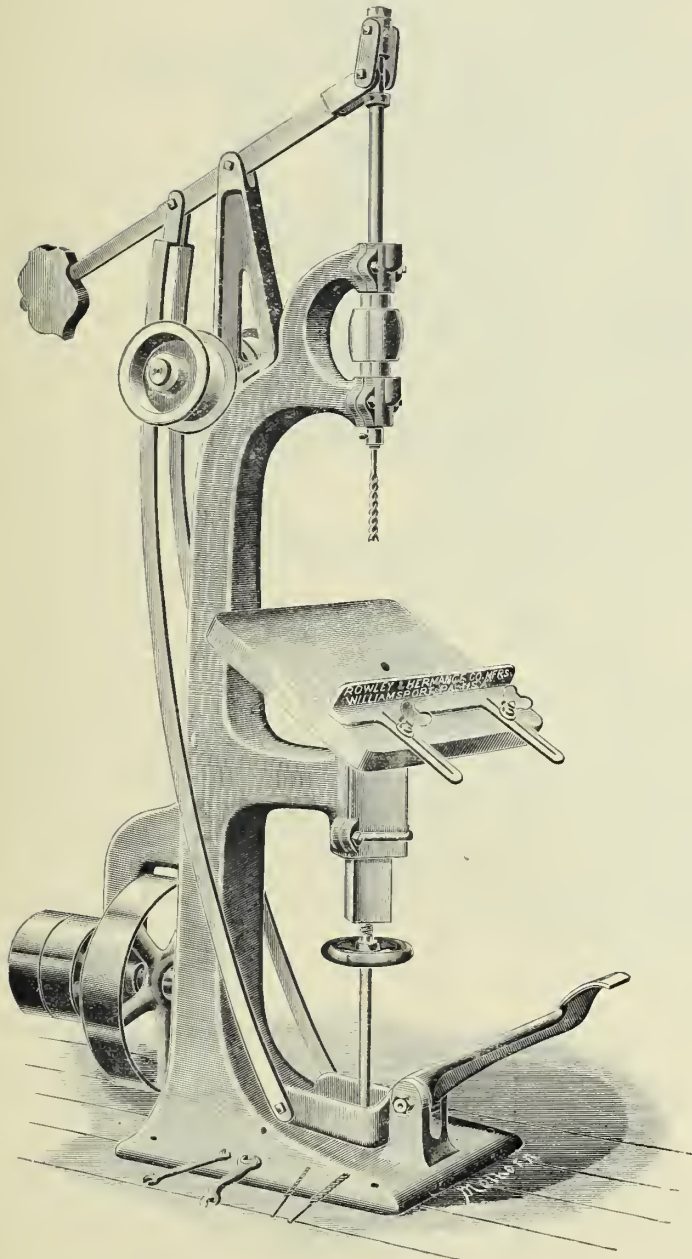
Improved New Style No. 2 Power Mortiser with Boring Attachment and Plain Table, complete with one chisel and one boring bit each of the following sizes: $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$ inch. Price, \$225.00.

Improved New Style No. 2 Power Mortiser with Clamp Table, Rack and Pinion Feed, without Boring Attachment, complete with one chisel each of the following sizes: $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$ inch. Price, \$215.00.

PRENTISS TOOL & SUPPLY CO.

IRON FRAME VERTICAL BORING MACHINE.

FIG. 1740.



THIS machine is intended for use in planing mills, furniture factories, carriage, wagon and agricultural works, and for straight or angular boring it has no equal.

The frame is iron, cast in one piece, cored out, and very strong. It is provided with a large base, so that when bolted to the floor the machine will not sway or vibrate.

The table is iron, 16 x 24 inches, and has an angle adjustment of 45°, also a vertical adjustment of 6 inches.

The gauge is adjustable to any position on the table, and can be used in front or back of the spindle. The spindle is steel and runs in self-oiling boxes. The bit and spindle are brought down to the work by the foot treadle.

The idler pulleys run at the proper angle to keep the belt true on the spindle pulley. It will bore 10 inches deep, and has a space of 10 inches between the centre of bit and inside of the frame.

We furnish with each machine one $\frac{3}{8}$, one $\frac{1}{2}$, and one $\frac{5}{8}$ inch boring bits.

Tight and loose pulleys are 8 x 3, and should run 700 revolutions per minute.

Weight, 650 pounds.

PRICE LIST.

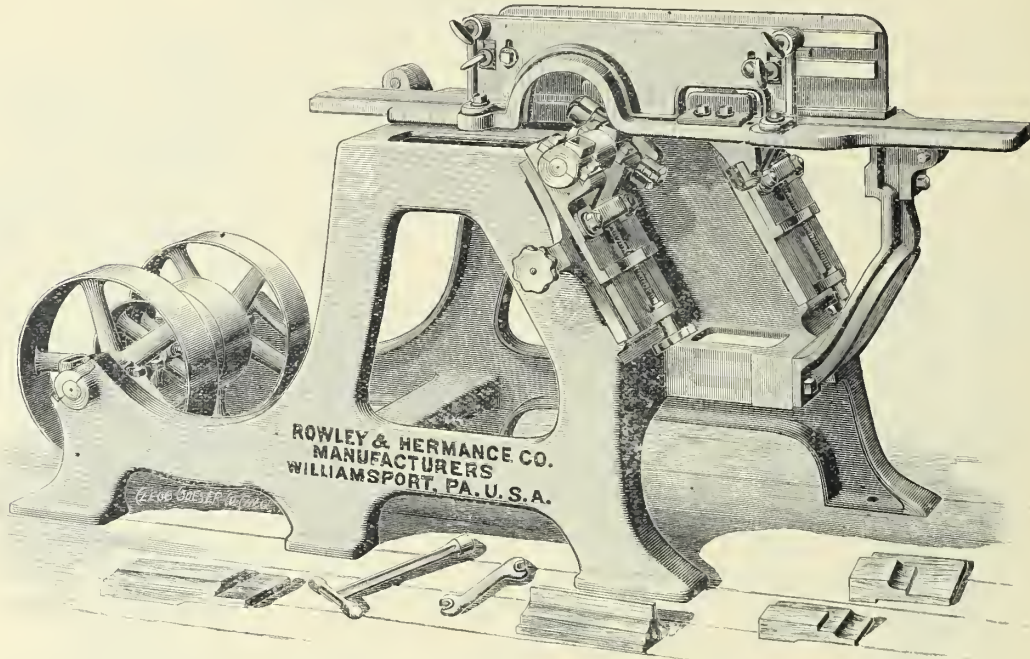
Vertical Boring Machine, iron frame, iron table 16 x 24 inches, gauge adjustable to any position on the table, to bore 6 inches deep, complete with one $\frac{3}{8}$, one $\frac{1}{2}$, and one $\frac{5}{8}$ inch boring bits. Price, \$125.00.

Three Spindle Horizontal Boring Machine. Price, \$150.00.

Two Spindle Horizontal Boring Machine. Price, \$120.00.

PRENTISS TOOL & SUPPLY CO.

FIG. 1741.



IMPROVED ADJUSTABLE PANEL RAISER.

THE above cut represents the New Improved Adjustable Panel Raiser, for raising any style of moulding, O. G., square or bevel. It will raise a panel on one or both sides, at one operation, from $\frac{1}{2}$ inch up to $4\frac{1}{2}$ inches without change of head or cutters. Can raise a bevel on one side and O. G. on the other, if desired, at one operation.

It is the strongest and most substantially built panel raiser on the market; simply, easily and quickly adjusted, and superior in every particular to any similar machine yet produced.

The frame is cast in one piece, making it very rigid.

We claim for it the following advantages over any similar machine:

1st. The right hand head setting in front of the left hand head admits of easier and quicker adjustment, and the guide being on the right of the operator makes it easier to operate.

2d. It will raise a panel on one or both sides at the same time, and make any desired variation on either side, up to $4\frac{1}{2}$ inches, without change of heads or cutters.

3d. The heads have a lateral adjustment, and as they raise or lower on an incline the tension of the belt remains the same.

4th. The cutters are set in a position to give a shear cut, thus making the panel perfectly smooth in brash or cross-grain stuff.

5th. It will cut smoother across the ends of panels than any other panel raiser made.

6th. Each head is provided with an independent adjustable pressure shoe, which holds the work perfectly rigid.

We guarantee this machine to give entire satisfaction.

Price, complete, with two sets of cutters, - - - - - \$190 00

PRENTISS TOOL & SUPPLY CO.

FIG. 1742.

PURCHASERS in need of Tenoning Machines naturally wish the best. The above machine has all the advantages of other machines of its class, together with valuable improvements not found in any other Tenoning Machine made.

It is adapted for tenoning doors, sash and blinds, framing furniture and other like work. It will cut tenons of any required thickness, and from $\frac{1}{2}$ inch to $6\frac{1}{2}$ inches long, in once passing through, or by passing through twice, to 9 inches long.

It is heavy, strong, durable and well made in all its parts.

Either headstock can be moved up or down independently. The top headstock can be adjusted horizontally, to permit the shoulders to be cut at uneven distances from the end. By a simple but effective arrangement the upper and lower heads are instantly connected, and both heads can be raised and lowered without changing the thickness of the tenon in the least.

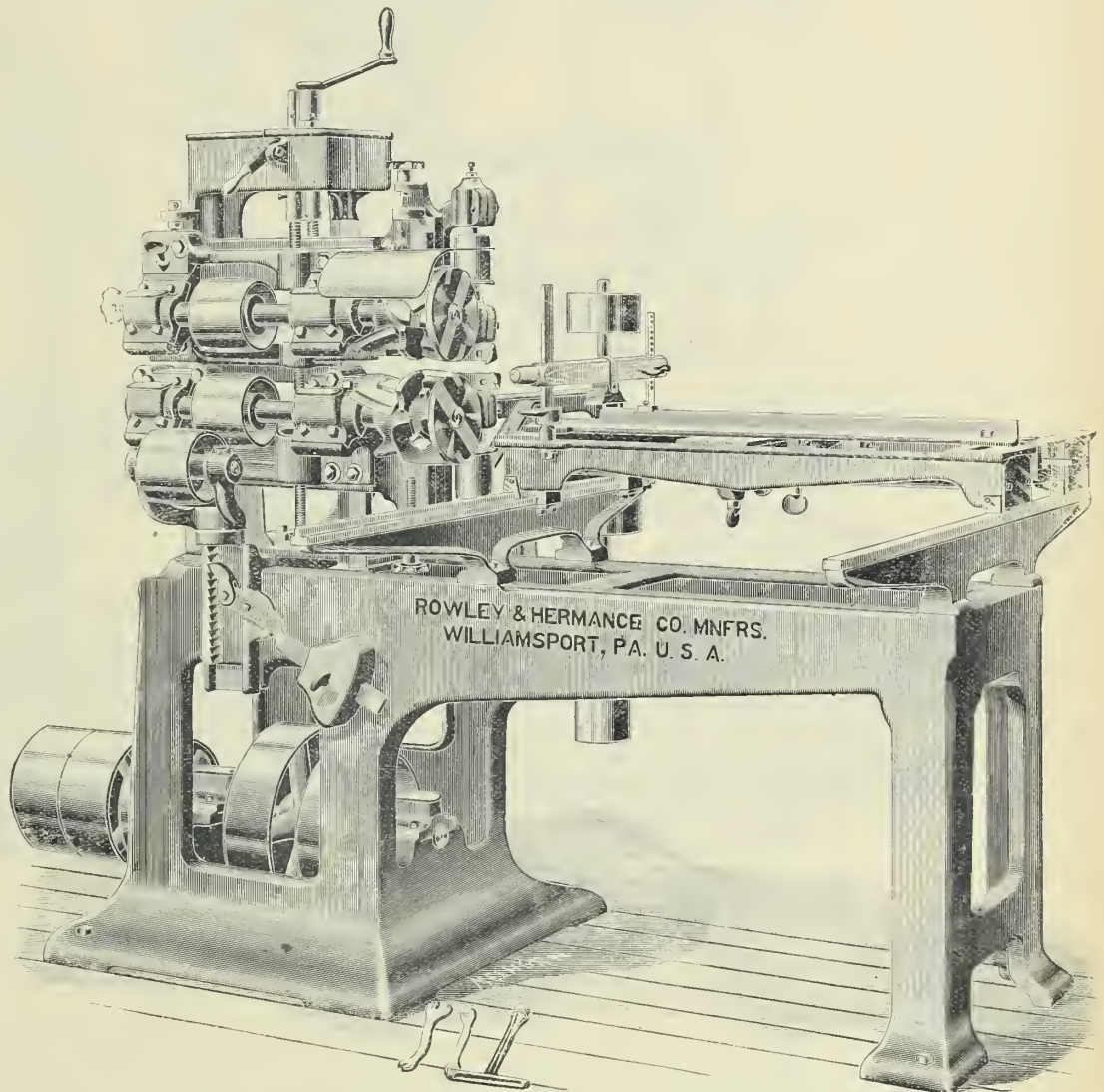
A single belt drives both cutter heads at the same speed. This belt is tightened by a self-adjusting idler pulley, operated by a weighted lever, with ratchet and pawl, which keeps the belt always at the proper tension.

The copes are attached to main headstocks and move vertically with them. Each has also an independent horizontal and vertical adjustment. They are driven from the vertical countershaft attached to the rear of the machine. The cutter heads are either single, $3\frac{1}{2}$ inches in length, or double, $6\frac{1}{2}$ inches long, as may be ordered, and are provided with our patent corrugated spurs.

The table is mounted on rollers, which relieves the friction, making it capable of turning out a larger amount of work with greater ease than any machine with sliding table. It has a safety hook underneath to prevent rising and getting into the cutters, a common accident in other machines. The hold-down bar is convenient to the operator, and can be adjusted for different thicknesses of work. The fence is adjustable to any angle desired. There is a tool box on top of machine. We guarantee it to be equal if not superior to any other tenoner made, and to give entire satisfaction. Tight and loose pulleys, 10 inches diameter and 4 inch face, and should run 900 revolutions per minute. Weight 1,500 pounds.

Improved No. 2 Tenoner with double heads and two copes, to tenon $6\frac{1}{2}$ inches long in one operation,	\$240.00
Same machine with double heads and one cope, -	232.00
Same machine with double heads, without copes, -	215.00
Same machine with single heads and two copes, -	225.00

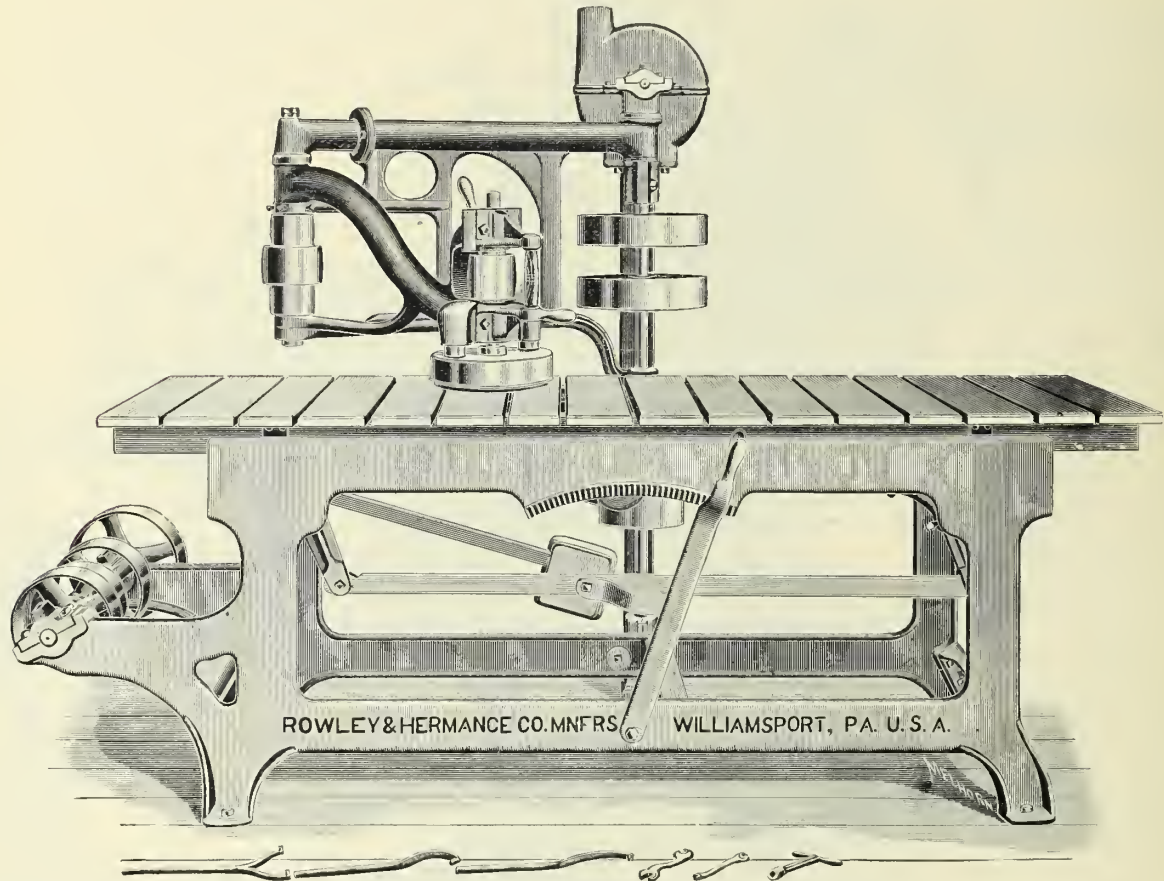
Same machine with single heads and one cope, -	\$215.00
Same machine with single heads, without copes, -	200.00
Rear cut-off saw attachment for either machine, extra,	15.00
Front cut-off saw attachment for either machine, extra,	30.00



NEW PATENT IMPROVED PEDESTAL No. 2 TENONING MACHINE.

PRENTISS TOOL & SUPPLY CO.

FIG. 1743.



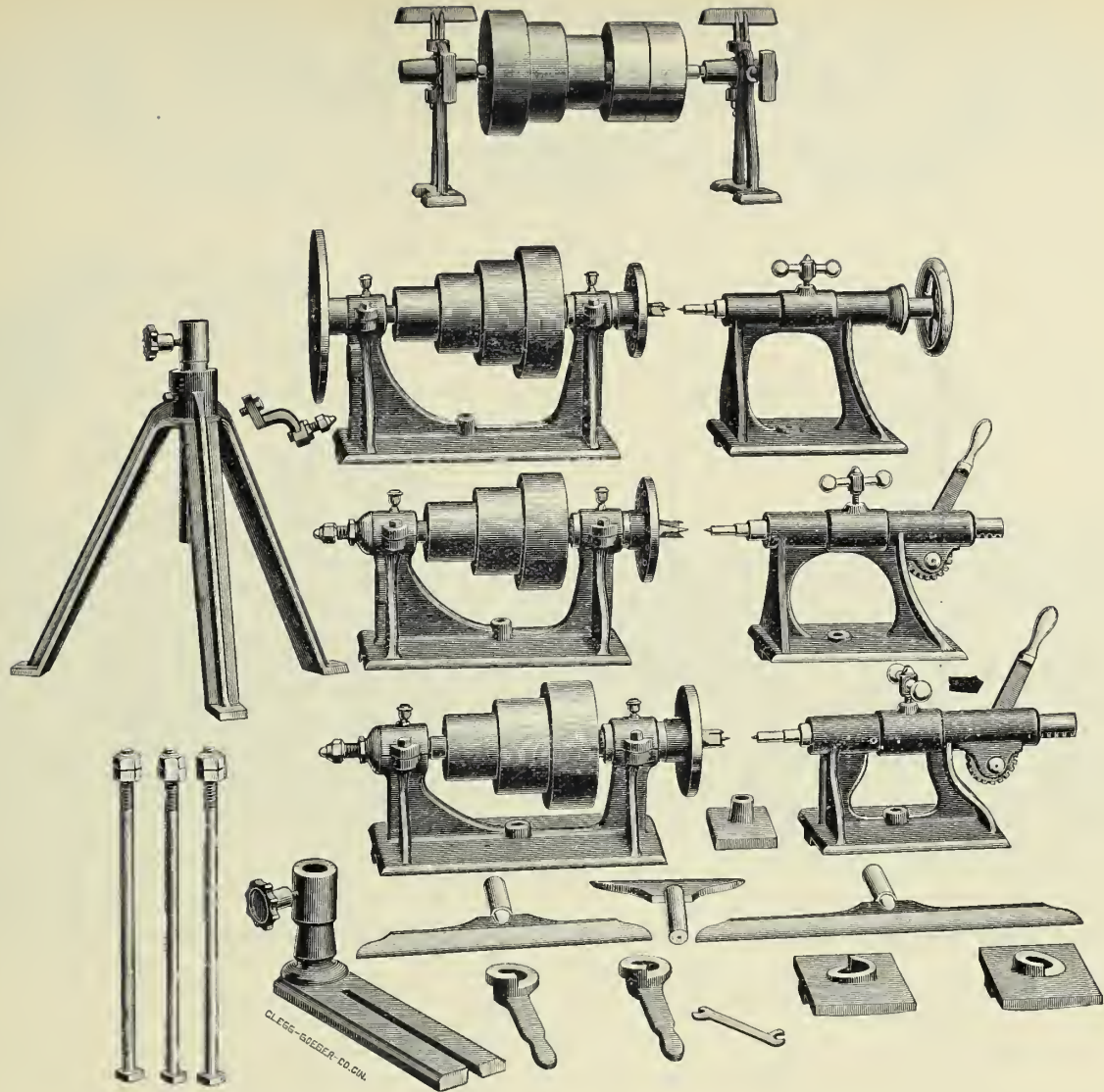
NICHOL'S PATENT IMPROVED EXTRA HEAVY SAND-PAPERING MACHINE, WITH SUCTION FAN.

THE above cut illustrates the New Pattern Extra Heavy Sand Papering Machine, with Suction Fan, which is acknowledged to be the best machine in the market for scouring, finishing and polishing sash, doors, blinds, furniture, piano cases or any flat surface. One great advantage of this machine is the suction fan attachment. The dust is drawn through hollow arms into the fan, and by attaching tin pipes is deposited in any required place, keeping the surface of the work and the shop free from dust, thus avoiding slow but sure death to the operator and workman in the room, caused by inhaling fine flinty dust into the lungs. It is simple in construction, not liable to get out of order, and has recently been improved. It has tight and loose pulleys, 8 inches in diameter by 4 inch face, and should run 600 revolutions per minute.

Those in want of a sand-papery machine should examine the advantages this machine has over the small, cheap machines that have no suction fan attachment. The difference in the price is not so great, when the cost of making a table to raise and fall, and the difference in setting up the machine, is taken into consideration.

Price, complete, with suction fan, - - - - - \$180 00

FIG. 1744.



IMPROVED WOOD TURNING LATHES.

WE submit new cuts of the Improved Wood Lathes for the inspection of the most critical mechanic, believing that comparison will show the advantage of these lathes. The quick return tail stock is an important improvement, as small work can be more quickly centered and removed after it is finished than by the old style screw tail stock. This improvement will be appreciated in furniture, sash and door factories, etc., as it often takes more time to adjust and remove the small pieces than to turn them.

Each lathe is furnished with one post, three rests (short, medium and long), one face plate, one spur and one hollow center, two eccentric plates and levers, and three rods for holding head and tail stocks and post in position.

We build these lathes either with the common screw tail stock or quick return, as ordered.

The cones are made of cherry, and are accurately balanced.

The cut of the 20 inch lathe shows the rear end face plate, which is furnished at extra price.

Twelve inch swing lathe without shears, complete with head and tail stocks (either screw or quick return tail stock), two posts, one 3 feet double rest, one medium single and one short single rests, one face plate, one spur and one hollow center, two eccentric plates and levers, and four rods for holding head and tail stocks and posts in position. Price, \$60.00.

Sixteen inch swing lathe without shears, complete as above. Price, \$70.00.

Twenty inch swing lathe without shears, complete as above. Price, \$80.00.

Rear end face plate for either lathe, extra. Price, \$15.00.

Floor stand for either lathe, extra. Price, \$10.00.



SIZES, HORSE-POWER, &c., OF NEW PATENT IMPROVED PUTNAM AUTOMATIC CUT-OFF STEAM ENGINES.

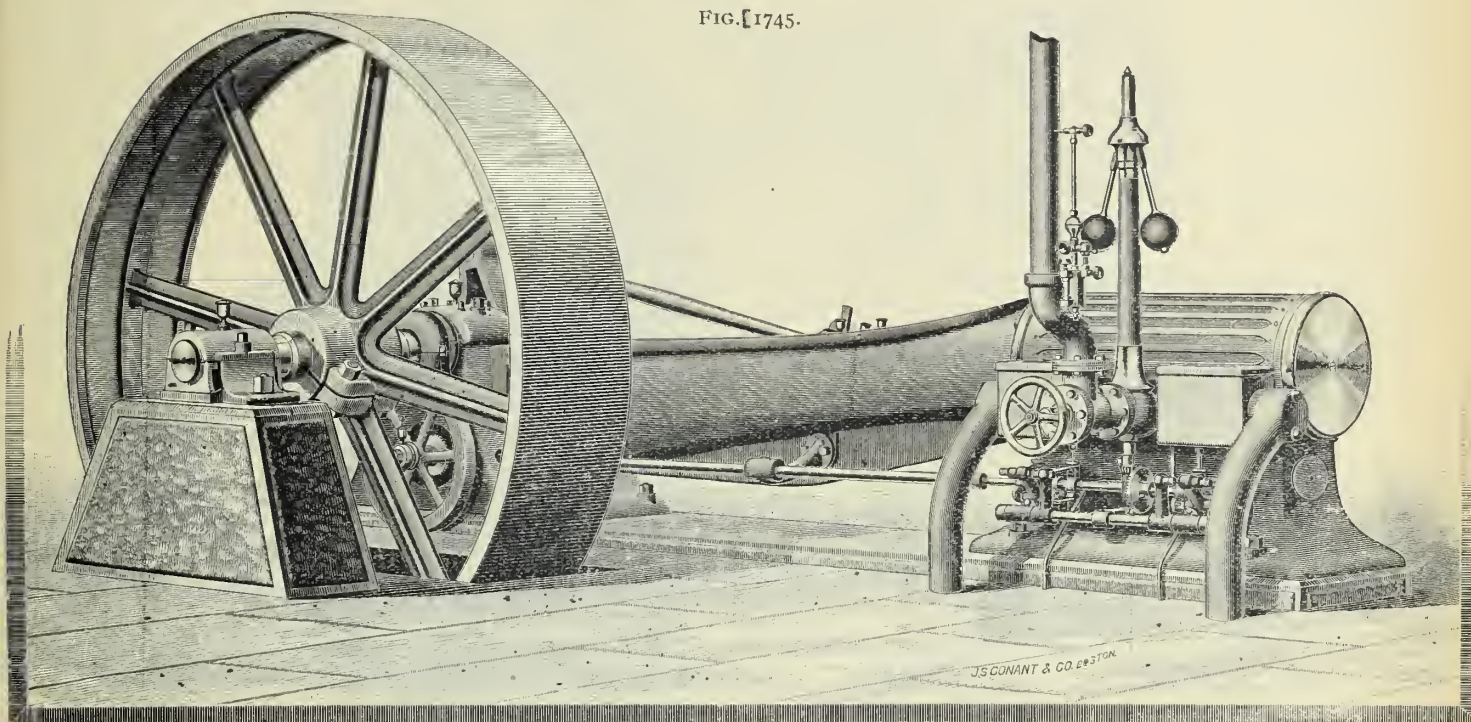
CYLINDER,		HORSE POWER.			FLY WHEELS FOR BELTS.				SPACE REQUIRED.				Price.
Diameter, Inches.	Stroke, Inches.	80 lbs. Initial Pressure Cut-off in Stroke.		Revolutions per Minute.	Diameter, Feet.	Face, Inches.	Weight. Pounds.	Total Weight, Pounds.	Center of Crank Shaft to End of Cylinder, with average width shaft.				
		2/10	3/10						Length.		Width.		
									Feet.	Inches.	Feet.	Inches.	
9	21	20	25	85	7	13	1500	5865	9	1	6	0	\$
10	24	30	35	80	8	13	2100	7280	10	1	6	9	
11	30	35	45	70	8	16	3200	10102	12	7	7	2	
12	33	45	55	65	10	19	4200	12370	14	4	7	2	
12	34	50	60	65	10	19	4400	12770	14	5	7	2	
14	36	60	80	60	10	21	5000	14730	15	6	8	3	
15	36	70	90	60	10	23	6600	18090	15	7	8	3	
16	36	80	105	60	10	25	8200	21334	15	6	9	2	
16	42	90	115	60	12	25	7800	23600	17	0	9	2	
18	42	105	135	55	14	25	8300	22750	17	5	9	6	
20	42	130	170	55	15	25	14800	36000	17	8	10	2	
20	48	150	200	55	16	31	16000	39000	19	5	10	2	
22	42	160	210	55	16	33	18000	38970	17	9	10	5	
22	48	180	235	55	16	36	20000	48000	20	5	12	3	
24	48	215	260	55	16	40	21000	58000					
26	48	250	330	55	18	44	30255	62000	20	6	13	9	
28	48	295	385	55	18	48							
30	54	345	450	50	18	51							
32	54	390	510	50	18	54							
34	54	445	570	50	20	58	32000	81000	23	7	17	8	
36	54	500	650	50	20	62	38000	96000	23	7	17	8	

For total length over all add to figures given above one-half the diameter of fly-wheel used.

Fly-wheels are turned on the face and edges, and as given in above table are such as we recommend for ordinary use; but they can be varied in size, weight, etc., to meet special requirements.

PRENTISS TOOL & SUPPLY CO

FIG. 1745.



NEW STANDARD PUTNAM PATENT AUTOMATIC CUT-OFF STEAM ENGINES.

IMPORTANT FEATURES AND SUPERIOR QUALITIES OF THE NEW PUTNAM ENGINE :

Admitting steam to the cylinder at boiler pressure.

Combining regulator with cut-off, by which the whole expansive force of the steam is made available, and uniform speed maintained.

Reducing the friction and power required to operate the engine to a very small amount.

Simplicity of construction and accessibility to all parts of the engine.

Greatest power, durability, economy of fuel, and smallest running expenses.

The most attractive and cleanly engine, easily cared for. Requires only ordinary skill, and least attention in running.

Small clearance and quick exhaust.

High class of finish. Heavy and substantial. Superior quality of material and perfection of workmanship. Large bearings, quick regulation and uniform speed.

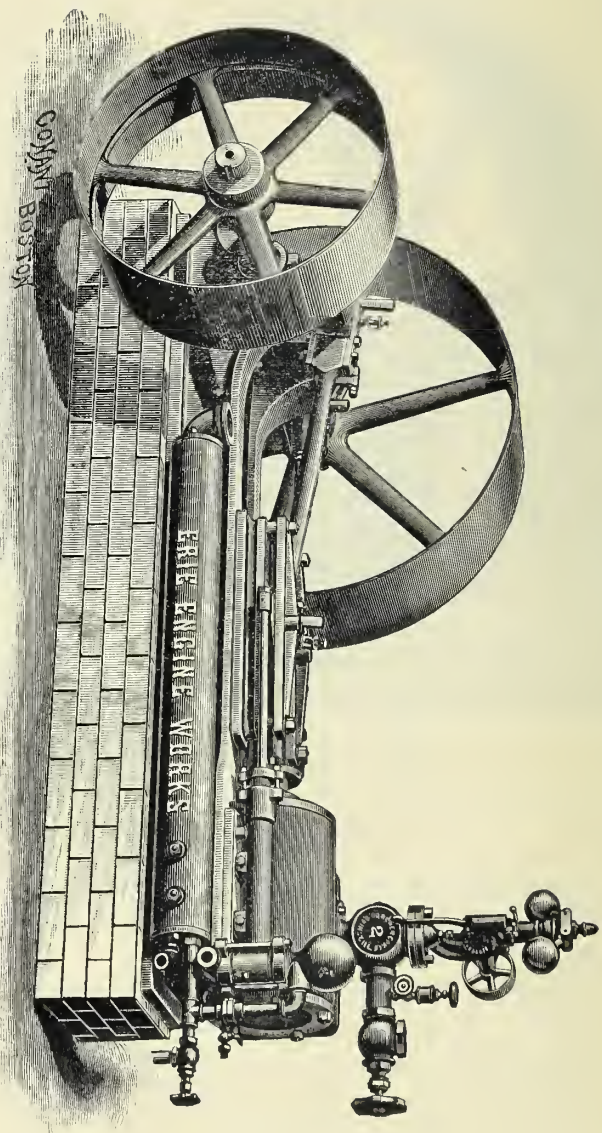
Freedom from repairs and consequent loss of time.

Changing of engine from right to left hand, or vice versa.

Dynamos: The Putnam Engine is giving the highest satisfaction running dynamos.

The Putnam Engine makes its own railing and safety guard, saving the expense of same after engine is set up, and also catches its own drip from the connecting rod, piston, etc., thereby saving the expense of pans and the annoyance of oil about the engine room. The gears are also protected from danger by shield. The general construction of the engine is one of greatest safety, economy and power.

FIG. 1746.



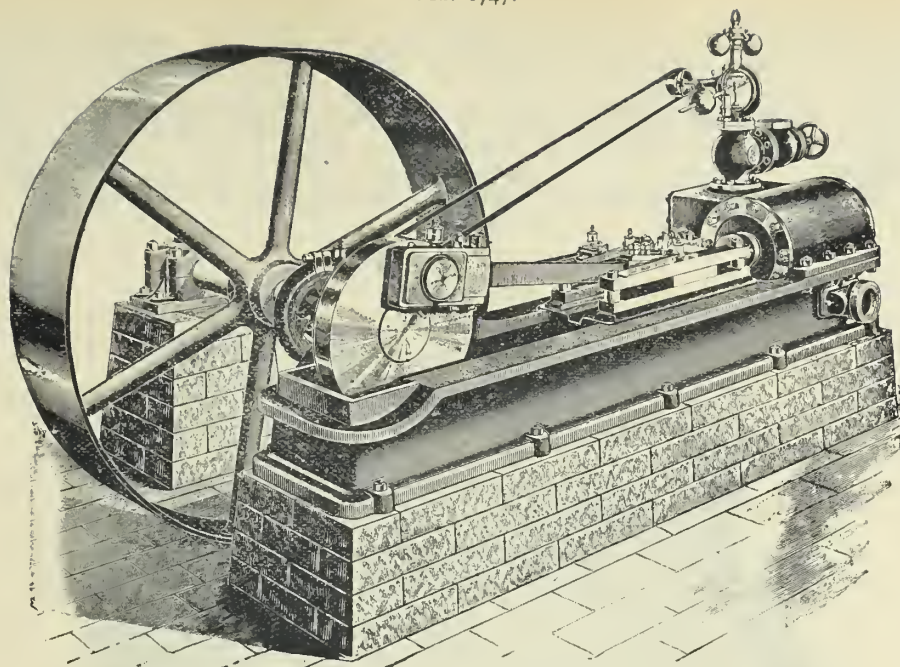
DETACHED (CENTER CRANK) ENGINES.

20 TO 125 HORSE POWER. ENGINES SMALLER THAN 20 H. P. HAVE CYLINDERS OVERHANGING BED.

THE cut illustrates the Detached (Center Crank) Engine. This engine is preferred in many localities to the side crank engine, as it is more easily set, requiring no extra foundation for out-end bearing. This cylinders are set low, same as the side crank engines. The cranks are solid forgings slotted out, having no welds, and the full disc "patent" crank balances perfectly balance the reciprocating parts. The slides and cross heads are extra in length and width, furnishing large wearing surfaces. By the attachment of a reversing link the engine is well adapted to hoisting purposes. The engine complete includes pulleys, governor with belt, throttle valve, sight feed lubricator and all necessary glass oil cups. Engines Nos. 0 to 11 can have pump and heater attached, if desired, at small additional charge.

SPECIFICATIONS.

Number of size,	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Horse power (as usually rated),	6	8	10	12	15	20	25	30	35	40	50	60	80	100	125
Diameter of cylinder, inches,	5	5	6	7	8	8	9	10	10	11	12	13	14	15	16
Length of stroke, inches,	8	8	9	10	10	12	12	12	15	15	16	16	18	18	18
Usual number of revolutions,	185	240	190	160	160	170	170	170	150	150	150	150	150	150	165
Diameter of pulleys, inches,	14x32	14x32	16x36	20x44	20x44	30x48	32x54	32x54	36x60	36x60	36x72	36x72	36x78	48x75	48x75
Face of pulleys, inches,	8 1/2 x 8 1/2	8 1/2 x 8 1/2	10 1/2 x 9 1/2	10 1/2 x 10 1/2	10 1/2 x 10 1/2	10 1/2 x 12 1/2	10 1/2 x 12 1/2	10 1/2 x 12 1/2	10 1/2 x 14 1/2	10 1/2 x 14 1/2	12 1/2 x 14 1/2	12 1/2 x 16 1/2	12 1/2 x 16 1/2	12 1/2 x 16 1/2	12 1/2 x 16 1/2
Diameter of shaft, inches,	2 1/8	2 1/8	2 3/8	2 1/2	2 1/2	3	3 3/8	3 3/8	4 1/8	4 1/8	4 3/8	4 3/8	6 1/2	6 1/2	6 1/2
Length of shaft, inches,	37	37	41	51	51	52	57	57 1/4	64	64	69	69	81	81	81
Length of journals, inches,	5	5	5 1/2	6	6	7	8	8	9	9	11	11	13	13	13
Diameter of crank pin, inches,	1 7/8	1 7/8	2 1/8	2 3/8	2 3/8	2 3/4	3 3/8	3 3/8	3 3/8	3 3/8	4 3/4	4 3/4	6	6	6
Length of engine bed, inches,	46	46	53	56	59	84	86	87	102	102	109	109	132	132	132
Width of engine bed, inches,	11	11	12	12	14	14	15	17	18	18	20	20	28	28	28
Diameter of steam pipe, inches,	1	1	1 1/2	1 1/2	2	2	2 1/2	2 1/2	3 1/2	3 1/2	3 1/2	3 1/2	4	4 1/2	4 1/2
Diameter of exhaust pipe, inches,	1 1/8	1 1/8	1 1/2	2	2 1/2	2 1/2	3	3 1/2	3 1/2	4	4 1/4	4 1/4	5	6	6
Diameter of water pipe, inches,	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4



STATIONARY (SIDE CRANK) ENGINES.

12 TO 125 HORSE POWER. SMALLER ENGINES THAN 20 HORSE POWER HAVE CYLINDERS OVERHANGING BED.

THE cut above illustrates the Stationary (Side Crank) Engines. These Engines have steel piston, valve rods and wrist pins. The beds are well proportioned and sufficiently heavy for duty required. The shafts are forged steel. The slides and cross-heads are extra in length and width, furnishing large wearing surfaces. The cylinders are set low on the beds and have hot air jackets, thereby decreasing condensation, special attention having been paid to the arrangement of the steam chest, ports and exhaust, so that the most perfect drainage is secured. The heater is independent of the bed, and all pipes easily accessible.

The engine complete includes band wheel, governor with belt, throttle valve, sight feed lubricator, and all necessary oil cups, cylinder and air cocks.

When ordering please state whether right or left-hand engine is preferred. The cut illustrates a right-hand engine.

Each engine is carefully tested under steam before shipment.

Any parts can be duplicated, special tools and templates being used in the construction of these engines.

Engines Nos. 3 to 11 can have pump and heater attached at small additional charge.

SPECIFICATIONS.

Number of size,	3	4	5	6	7	8	9	10	11	12	13	14
Horse power, -	12	15	20	25	30	35	40	50	60	80	100	125
Usual number of revolutions, -	160	160	170	170	170	150	150	150	150	150	150	165
Diam. cylinder and length of stroke, in.,	7x10	8x10	8x12	9x12	10x12	10x15	11x15	12x16	13x16	14x18	15x18	16x18
Diameter of band wheel, - inches,	48	48	54	60	60	72	72	84	84	84	84	96
Face of band wheel, - inches,	12½	12½	12½	14½	14½	14½	14½	16½	16½	16½	16½	18½
Diameter of shaft, - inches,	2½	2½	3	3¾	3¾	4½	4½	4¾	4¾	6½	6½	6½
Length of shaft, - feet,	4	4	4½	4½	5	5½	5½	6	6	6	6	6
Length of journals, - inches,	6½	6½	7	8	8	9	9	11	11	12	12	12
Diameter of crank pin, - inches,	2¾	2¾	2¾	3¾	3¾	3¾	3¾	4¾	4¾	6	6	6
Diameter of steam pipe, - inches,	1½	2	2	2¼	2½	2½	3	3½	3½	4	4½	4½
Diameter of exhaust pipe, inches,	2	2½	2½	3	3½	3½	4	4½	4½	5	6	6
Diameter of water pipe, - inches,	¾	¾	¾	1	1	1	1	1¼	1¼			

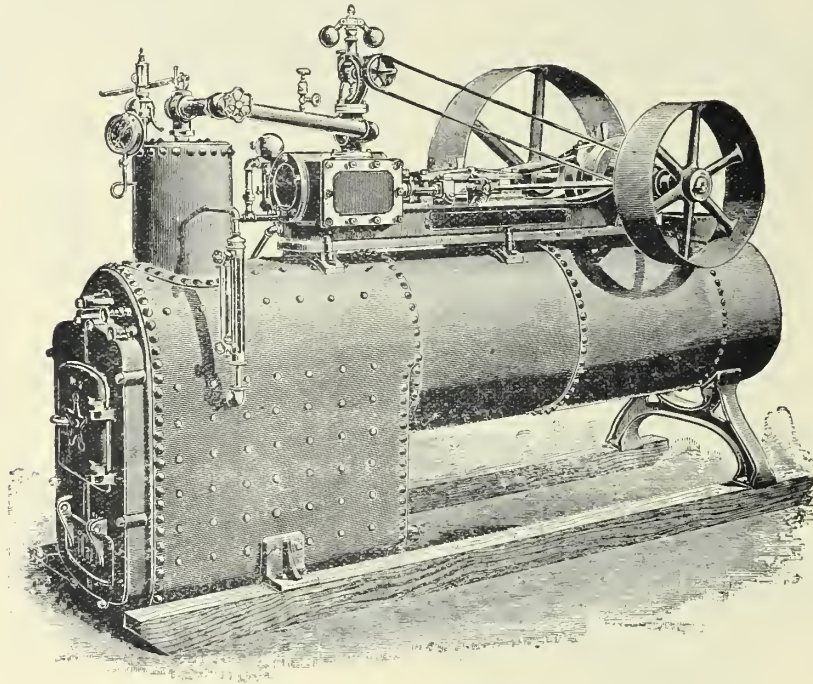
SIZES OF FLY WHEEL AND PULLEY.

(Substituted in place of balance wheel when so ordered.)

Diameter of fly wheel, -	inches	60	62	72	72	84	84	84	96	96	96
Diameter of pulley, -	inches	36	36	40	40	44	44	44	48	48	48
Face of pulley, -	inches	10½	12½	12½	12½	12½	14½	16½	16½	16½	18½

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FIG. 1748.



PORTABLE ENGINES.

6 TO 50 H. P. ENGINES. SMALLER THAN 20 H. P. HAVE CYLINDER OVERHANGING BED.

THE cut shows Portable Engine, 6 to 50 horse power, inclusive. We have described the engine used and boiler on separate pages. This style of engine and boiler combined is particularly adapted for portable work, where no expensive or permanent foundation is required, the outfit being complete and ready for use when leaving our works. The engine may at any time be detached from boiler by simply taking out the bolts holding it to the iron saddles on the boiler, leaving no holes to plug and disconnecting the steam pipe. The sizes of pulleys, as given in specifications, will be found suitable for nearly all kinds of work, but can be changed, if necessary, adding or deducting in price as the case may be. Nos. 9 and 10 have extra feet and additional leg for sufficient support. A cold water suction pump driven by belt or hand will be furnished, if desired, but charged extra. Each Portable Engine is thoroughly tested under steam (after cold water test) before shipment.

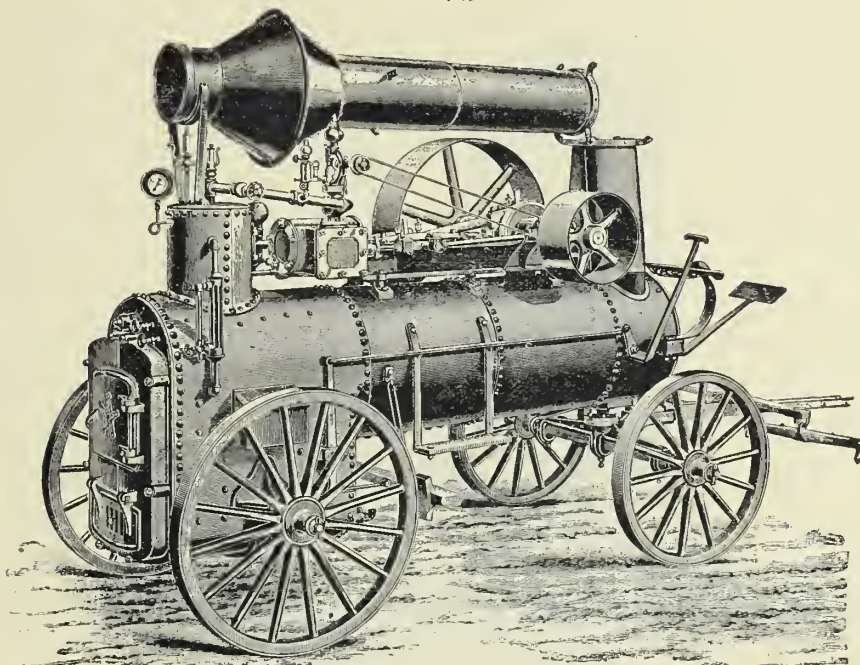
These engines complete, have the necessary oil cups, sight feed lubricator, steam gauge, water gauge, whistle, gange cocks, throttle, blow-off, check, stop and safety valve, stack and guy rods, governor with belt, pulleys, pump and heater.

SPECIFICATIONS.

Number of size,	0	1	2	3	4	5	6	7	8	9	10
Horse power,	6	8	10	12	15	20	25	30	35	40	50
Diameter of cylinder, inches,	5	5	6	7	8	8	9	10	10	11	12
Length of stroke, inches,	8	8	9	10	10	12	12	12	15	15	16
Usual number of revolutions,	185	240	190	160	160	170	170	170	150	150	150
Diameter of pulleys, inches,	14&32	14&32	16&36	20&44	20&44	30&48	32&54	32&54	36&60	36&60	36&72
Face of pulleys, inches,	8½&8½	8½&8½	8½&9½	10½&10½	10½&10½	8½&12½	10½&12½	10½&12½	10½&14½	10½&14½	12½&14½
Diameter of boiler, inches,	26	28	30	32	32	34	36	36	40	40	40
Length of furnace, inches,	34	36	38	38	44	52	52	52	52	60	60
Height of furnace, inches,	30	32	34	38	38	38	40	40	44	44	44
Width of furnace, inches,	21	22	24	26	26	28	30	30	34	34	34
Number of 3-incl tubes,	17	20	22	26	26	30	34	34	40	42	42
Length of tubes, inches,	54	66	72	72	78	90	96	102	102	120	144
Diameter of stack, inches,	12	14	14	15	15	16	18	18	20	26	20
Length of stack, feet,	18	20	20	20	20	24	24	30	35	35	40

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FIG. 1749.



PORTABLE ENGINES ON WHEELS.

6, 8, 10, 12, 15, 20, 25, 30 and 35 HORSE POWER.

ON this page is illustrated the Portable Engine on Wheels. The boilers used are the regular portable boilers. On small sizes, 6, 8, 10, 12 and 15 horse power, the engines have cylinders overhanging bed, as shown in cut. On all sizes above 15 horse power the regular engines are used. The stack, with spark arrester, as shown in the cut, and hinged to lie down, must necessarily be shorter, but if the usual stack is desired, we will substitute that for the one shown in cut, without change in price. When ordering, please state which stack is preferred. Each portable is thoroughly tested under steam (after cold water test) before shipment.

These engines, complete, have the necessary oil cups, sight-feed lubricator, steam gauge, water gauge, whistle, gauge cocks, throttle, blow-off, check, stop and safety valve, governor, with belt, pulleys, pump and heater, pole, neck yoke, eveners, whiffletrees and brake.

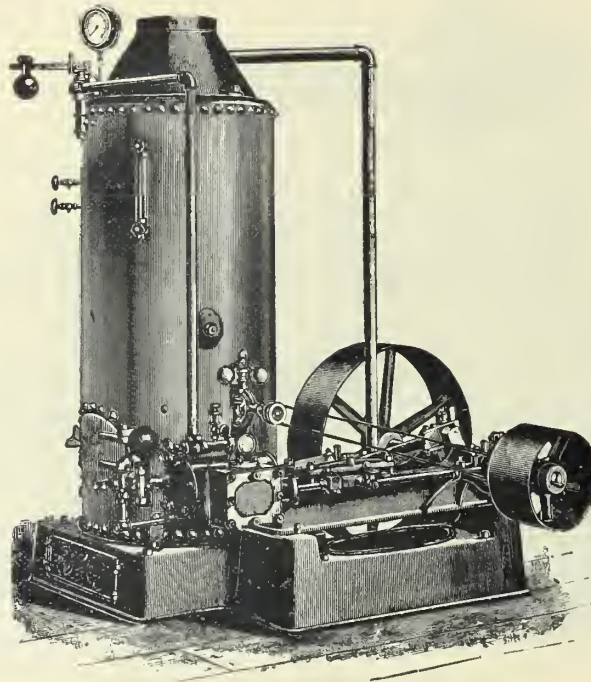
A hand pump, with hose for filling boiler, will be furnished, if desired, but charged extra.

SPECIFICATIONS.

Number of size, - - -	0	1	2	3	4	5	6	7	8
Horse power, - - -	6	8	10	12	15	20	25	30	35
Diameter of cylinder, inches,	5	5	6	7	8	8	9	10	10
Length of stroke, - inches,	8	8	9	10	10	12	12	12	15
Usual number of revolutions,	185	240	190	160	160	170	170	170	150
Diameter of pulleys, - inches,	14&32	14&32	16&36	20&44	20&44	30&48	32&54	32&54	36&60
Face of pulleys, - inches,	8½&8½	8½&8½	8½&9½	10½&10½	10½&10½	8½&12½	10½&12½	10½&12½	10½&14½
Diameter of boiler, - inches,	26	28	30	32	32	34	36	36	40
Length of furnace, - inches,	34	36	38	38	44	52	52	52	52
Height of furnace, - inches,	30	32	34	38	38	38	40	40	44
Width of furnace, - inches,	21	22	24	26	26	28	30	30	34
Number of 3-inch tubes, -	17	20	22	26	26	30	34	34	40
Length of tubes, - inches,	54	66	72	72	78	90	96	102	102

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FIG. 1750.



COMBINED ENGINES AND VERTICAL BOILERS.

ON this page is illustrated the Vertical Boiler and detached engine connected together, which we term the Combined Engine. Our attention having been called to numerous localities for an engine and boiler of small power, where space is also limited, we introduce this particular style, sufficient for such demands, claiming it more preferable to the many outfits offered with vertical engines used. The outfit complete is furnished as shown in the cut, with all trimmings and pipe connections made. The bases on which both engine and boiler rest can be disconnected, if desired.

The engine or boiler will be furnished separately, if desired.

SPECIFICATIONS.

	0	1	2	3	4	5	6
Number of size, - - - - -	0	1	2	3	4	5	6
Horse power, - - - - -	6	8	10	12	15	20	25
Diameter of cylinder, - - - inches,	5	5	6	7	8	8	9
Length of stroke, - - - inches,	8	8	9	10	10	12	12
Usual number of revolutions, - - -	185	240	190	160	160	170	170
Diameter of pulleys, - - - inches,	14 & 32	14 & 32	16 & 36	20 & 44	20 & 44	30 & 48	32 & 54
Face of pulleys, - - - inches,	8½ & 8½	8½ & 8½	8½ & 9½	10½ & 10½	10½ & 10½	8½ & 12½	10½ & 12½
Diameter of boiler, - - - inches,	30	30	30	36	36	36	42
Diameter of furnace, - - - inches,	25	25	25	31	31	31	31
Height of furnace, - - - inches,	27	27	27	27	27	27	27
Length of tubes (2 inches diam.), - inches,	30	39	45	45	57	73	73
Number of tubes, - - - - -	49	51	53	68	68	68	109
Size feed pipe, - - - - - inches,	¾	¾	¾	¾	¾	1	1
Size blow-off pipe, - - - inches,	1	1	1	1	1¼	1¼	1¼
Size of safety valve, - - - inches,	1	1¼	1½	1½	2	2	2½

These vertical boilers will be furnished with tubes submerged, same dimensions, excepting height over all, will be increased 14 to 20 inches on boilers 30 and 36 inches in diameter.



SKINNER BALANCED SLIDE VALVE ENGINES.

STRICTLY HIGH GRADE THROTTLING ENGINES.

IN proportions, workmanship and design it is the equal of any automatic engine, and will give as much power (which is greatly in excess of the capacity of ordinary slide valve engines).

We guarantee the power that these engines will develop (see table), and to be of such strength and proportions that they may be brought to a standstill by overload with a boiler pressure of 125 pounds without distress or heating of any part. This is obtained by massive proportions and superior steam distribution.

The bed of this engine is a massive casting, with base rectangular in form, having firm bearing on every part of a simply built foundation. Side walls extend above centre line of engine from shaft to cylinder, with web connecting the two walls. Catches all drip from different parts of the engine, conveying it to one point of exit. In side-crank form it is superior to any construction known.

The valve is one of the important features of this engine. It is of the plain slide pattern, accurately fitted to the seat by scraping, 80 per cent. of the area relieved from pressure. This valve is free to lift from seat, follows up natural wear, requires no adjustment, insuring easy movement, saves wear of the seat, valve, slides and eccentric, and adds to efficiency of the engine. Guaranteed to be and to remain steam tight under all operating conditions.

Shaft and pin made of hammered steel of large diameters and ground to gauge.

Large governor; steam and exhaust openings for heavy duty. Governor has stop motion attachment.

Heavy wheel weight.—No part subject to wear cast with bed or cylinder but attached thereto by machine surfaces held in place by stud bolts and case hardened nuts instead of tap bolts, such as main bearings, guides, stuffing boxes and valve slides, which are adjustable by simple means, removable and duplicated from stock. Sight-feed flushing oil cups used throughout.

An alignment device never before used. No part necessary to completeness charged as extras.

The main shaft and crank pin are made of the best open hearth steel, of the best known proportions, and by sizes given in table, it will be seen that the crank pins are larger than ever before used on engines of same size. They are all carefully ground to size after turning.

The guides are adjustable and removable and have large wearing surfaces, and are the regular locomotive pattern.

The cross head, which is very large, contains most of the reciprocating weight that has been found necessary to smooth running. Formerly the cross-head pins have been the source of much trouble, but these will be found exceptionally large.

The reciprocating parts are accurately counterbalanced by a suitable weight in the crank disc.

Every engine tested before shipping, and will be found to be and to do just as represented in this catalogue.

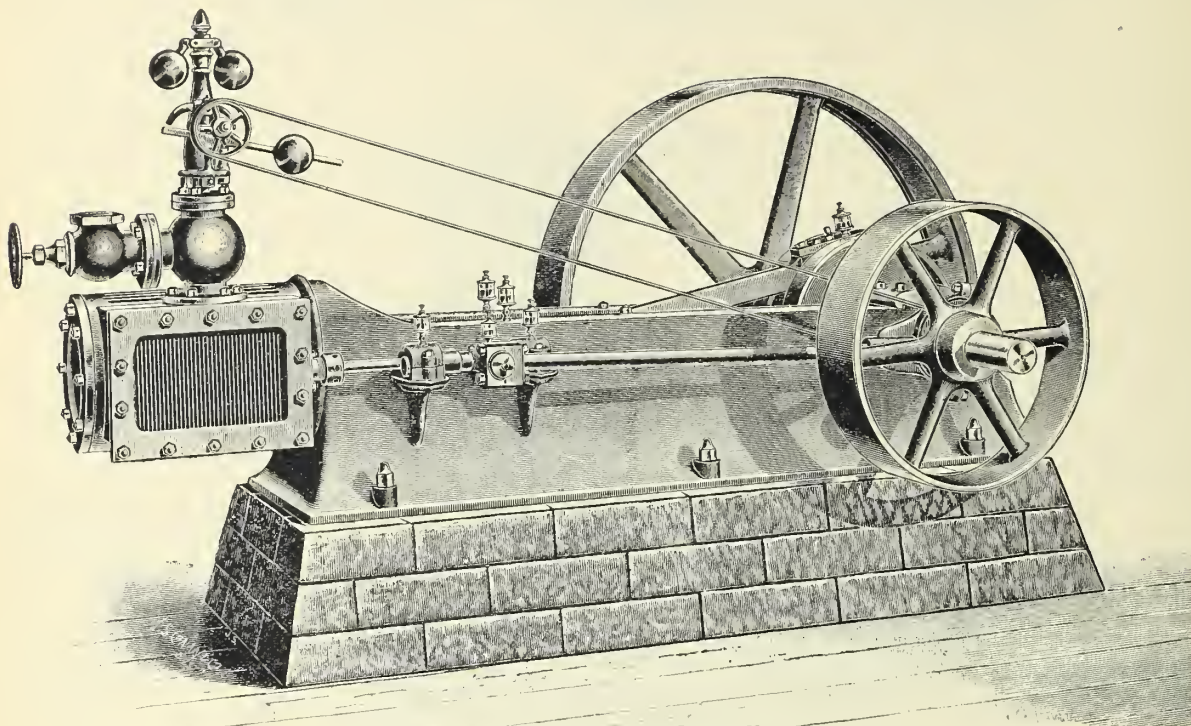
The whole make up of this engine is equal to the best automatic engine in the market, and is complete with standard stop motion governor of any desired make; governor belt; sight feed glass oilers for every bearing; sight feed cylinder lubricator; throttle valve and anchor bolts.

SKINNER BALANCED SLIDE VALVE ENGINES.

Strictly High Grade Throttling Engines

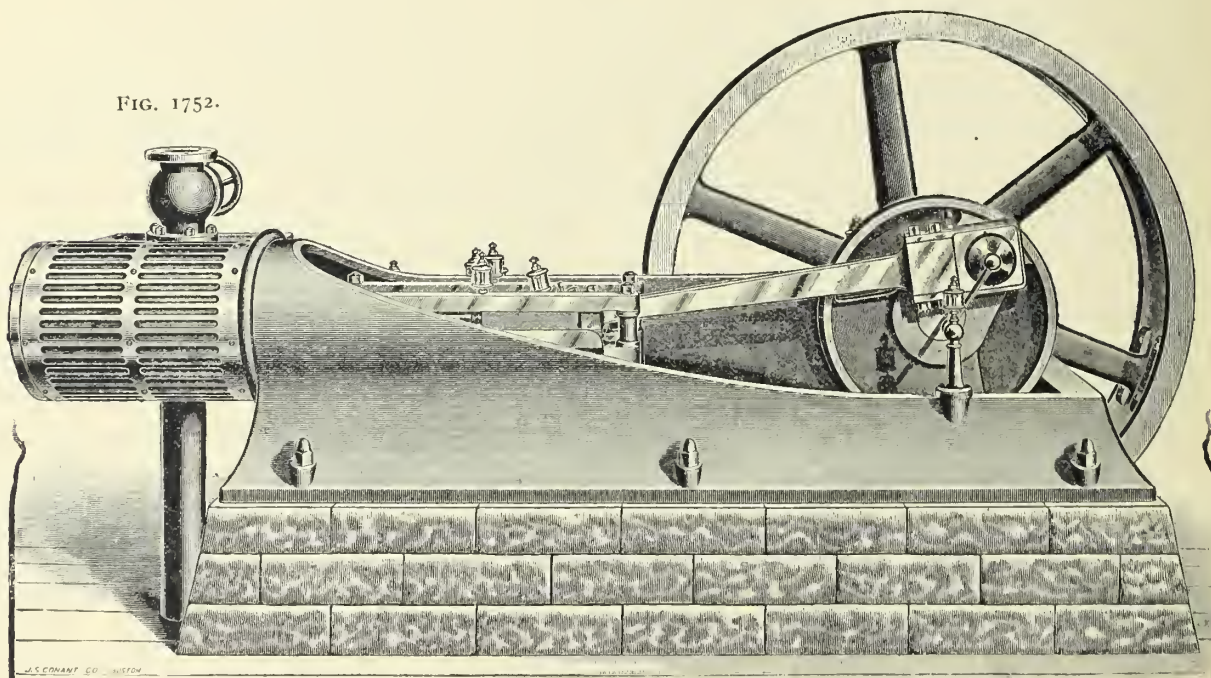
For all Manufacturing Purposes.

FIG. 1751.



CENTER CRANK ENGINES.—25 TO 150 H. P.

FIG. 1752.



SIDE CRANK ENGINES.—FULL SIDE VIEW.—25 TO 250 H. P.



SKINNER BALANCED SLIDE VALVE ENGINES.

SIDE CRANK. 25 TO 250 H.-P.

Engine No.	Size of Cylinder.	Revolutions per Minute.	Horse Power.	Band Fly Wheel.			Size of Shaft.		Size of Pipes.		Size of Bearings and Shaft.		Size of Crank Pin.		Weight.
				Diam.	Face.	Weight.	Length.	Diam.	Steam	Exhaust.	Diam.	Length.	Diam.	Length.	
9½	10 x 12	150 to 250	24 to 48	54	12	800	60	4	2½	3	4	8	4	3½	4000
10	10 x 15	150 to 225	30 to 60	60	12	1000	72	5	2½	3	5	9	4	3½	4600
11	11 x 15	150 to 225	36 to 72	60	14	1200	72	5	2½	3	5	9	4	3½	4800
11½	12 x 15	130 to 200	40 to 75	72	14	1400	72	5	3	3	5	9	4	3½	5400
12	12 x 18	130 to 200	45 to 90	72	16	1800	84	5	3	3½	5	11	5	4½	8400
13	14 x 18	130 to 200	60 to 125	84	16	2300	84	6	3½	4	6	11	5	4½	8800
14	15 x 18	130 to 200	72 to 145	96	18	2800	90	6½	5	6	6½	13	5	4½	9500
15	16 x 18	130 to 200	82 to 165	96	18	3200	90	6½	5	6	6½	13	5	4½	10500
16	18 x 24	120 to 150	100 to 200	96	24	4000	108	8	5	7	8	14½	6	4½	18000
17	20 x 24	120 to 150	225 to 250	108	24	5000	108	8	6	8	8	15½	6	4½	20000

Size of large wheels, on centre or side crank, changed to suit requirements with same weight retained. Extra charge for extra weight.

THROTTLING ENGINES.

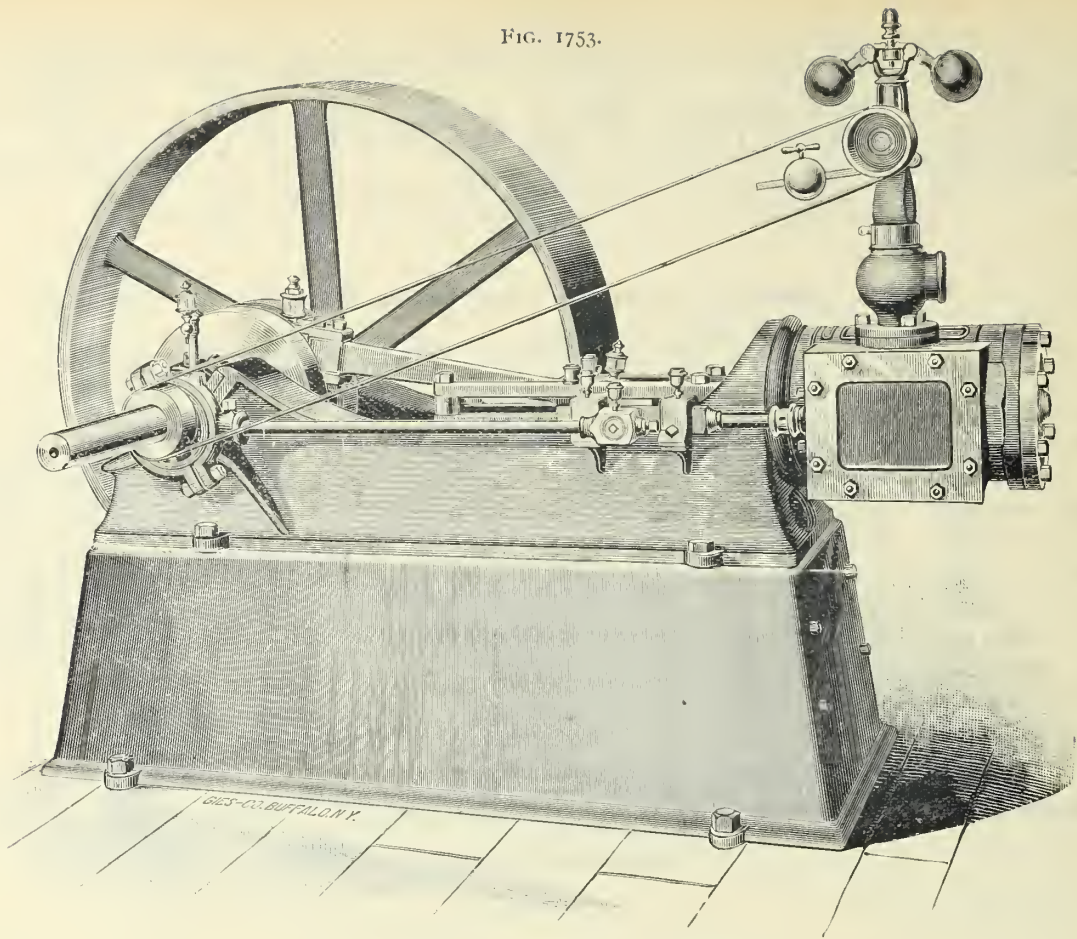
CENTER CRANK.

Engine No.	Size of Cylinder.	Revolutions per Minute.	Horse Power	Size of Fly Wheel.	Size of Pulley.	Bore of Fly Wheel and Pulley.	Size of Pipe		Size of Bearings and Shaft.		Size of Crank Pin.		Weight.
							Steam.	Exhaust.	Diam.	Length.	Diam.	Length.	
9½	10 x 12	150 to 300	24 to 48	54 x 12	30 x 12	4	2½	3	4	8¼	4	3½	4000
10	10 x 15	150 to 225	30 to 60	60 x 12	30 x 12	3½	2½	3	5	9	4	3½	4100
11	11 x 15	150 to 225	36 to 72	60 x 12	30 x 12	3½	2½	3	5	9	4	3½	4500
11½	12 x 15	130 to 200	40 to 75	60 x 12	30 x 12	5	3	3½	5	9	4	3½	5000
12	12 x 18	130 to 200	45 to 90	72 x 14	36 x 14	5	3	3½	5	11	5	4½	7500
13	14 x 18	130 to 200	60 to 125	72 x 14	36 x 14	5	3½	4	6	11	5	4½	8100
14	15 x 18	130 to 200	72 to 145	78 x 16	42 x 16	6	5	6	6½	13	6	4½	8500
15	16 x 18	130 to 200	82 to 165	78 x 16	42 x 16	6	5	6	6½	13	6	4½	9000

POWER THAT THESE ENGINES WILL DEVELOP AT A GIVEN SPEED AND BOILER PRESSURE.

Revolutions, -	Boiler pressure, -	130			150			175			200			225		
		70	80	90	70	80	90	70	80	90	70	80	90	70	80	90
9½	10 x 12				24	27	31	29	33	37	33	38	43	37	42	47
10	10 x 15				31	36	40	36	41	46	41	47	53	47	53	59
11	11 x 15				37	43	48	44	50	56	50	57	64	56	64	72
11½	12 x 15	39	44	49	44	51	58	52	60	68	60	68	76			
12	12 x 18	46	53	60	54	61	69	63	72	81	72	82	92			
13	14 x 18	61	72	83	74	84	94	85	98	111	98	112	126			
14	15 x 18	73	83	94	84	96	108	98	112	126	112	128	144			
15	16 x 18	83	95	107	96	109	123	112	128	144	127	146	165			
16	18 x 24	120	140	160	138	161	185	These Engines are of massive proportions and capable of safely transmitting much greater power than here given.								
17	20 x 24	148	172	197	171	200	228									

FIG. 1753.



THE ORIGINAL "TITAN" ENGINE.

SMALL CENTER CRANK ENGINES, WITH AND WITHOUT IRON BASE; 8 TO 20 H. P.

THE table below gives sizes and principal dimensions of engine illustrated above. This is the well-known engine, which has given such universal satisfaction in the past, and which is made in the same thorough manner as heretofore. These engines are sent out complete in every part, with disc counterbalanced crank, automatic stop governor, governor belt, sight feed cylinder lubricator, sight feed oil cups on all bearings, foundation bolts, wrenches, exhaust pipe, and all necessary fittings to put the same in running order. They are the only sizes to which we attach pump and heater, when desired; and they can be furnished at small extra cost with sub-base, as shown in cut, or mounted on the portable return flue boiler or the locomotive fire box boiler, either on skids or on wheels.

We call attention to the solidity and completeness of these engines. The shafts are made of open hearth steel. The guides are adjustable. We use the removable stuffing boxes, also studs and case-hardened nuts in place of ordinary tap bolts.

These engines will economically develop the power given in the table below, and a corresponding addition to pressure if boiler power and speed are increased.

SPECIFICATIONS.

Number, -	6	7	8	9
Horse power, -	8	10	15	20
Size of engine, -	6 x 8	7 x 10	8 x 12	9 x 12
Pressure required to develop full H. P., pounds,	60	60	60	60
Number of revolutions per minute,	150	150	150	187
Size of steam pipe, inches,	1½	1½	2	2
Size of exhaust pipe, inches,	1½	1½	2	2½
Size of fly-wheel, inches,	36 x 8	42 x 11	48 x 11	48 x 11
Size of pulley, inches,	24 x 8	24 x 8½	24 x 8½	24 x 8½
Weight complete, about, pounds	1250	1700	2400	2500

DIMENSIONS OF FOUNDATIONS.

Number, -	6	7	8	9
Horse power, -	8	10	15	20
Length at floor line, inches,	48	57	70	70
Width at floor line, inches,	18	22	29	29
Length at top line, inches,	46	55	64	64
Width at top line, inches,	16	20	23	23
Height from floor line to bottom of bed, inches,	17	19	16	20
Distance from floor line to center shaft, inches,	25	28	28	32

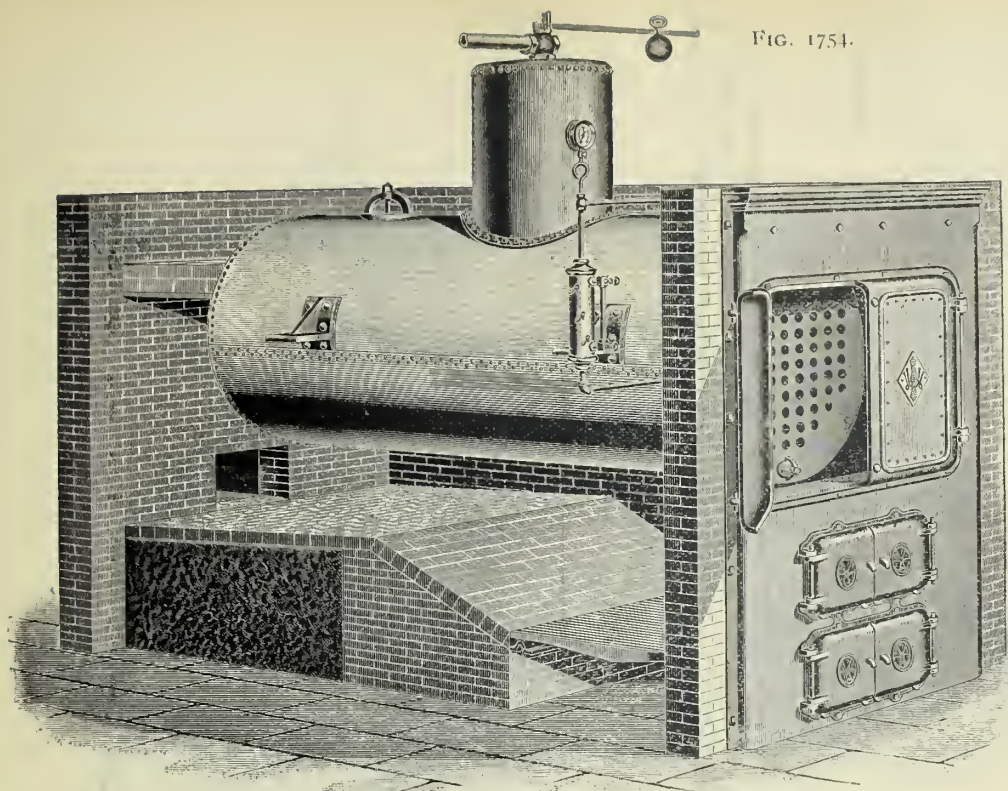


FIG. 1754.

FULL FRONT STATIONARY TUBULAR BOILER.

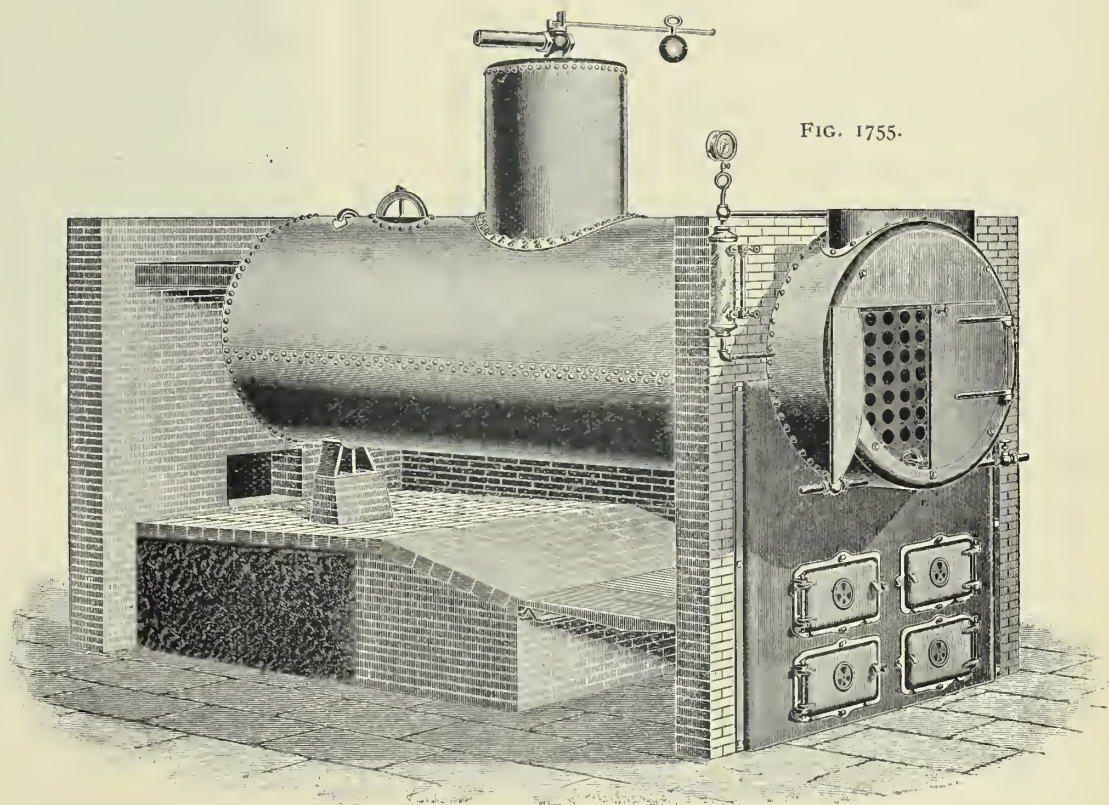
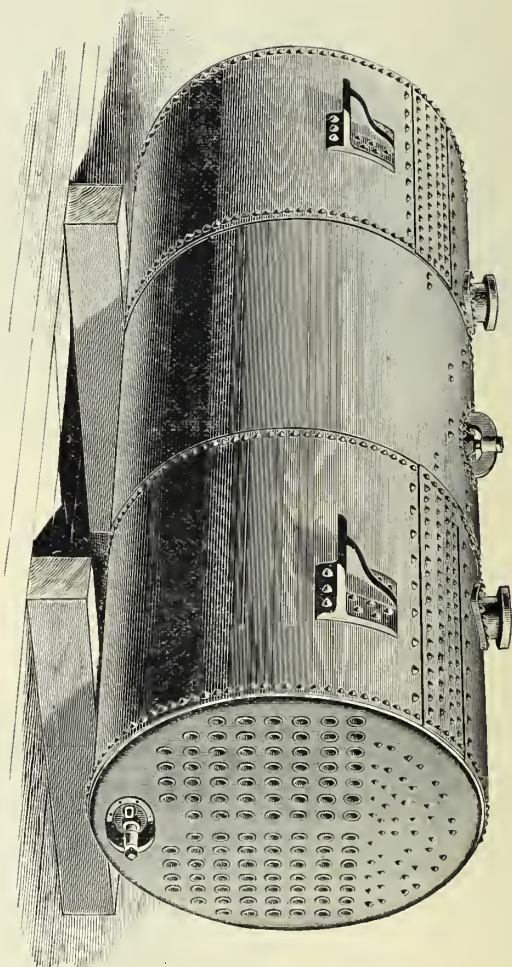


FIG. 1755.

HALF FRONT STATIONARY TUBULAR BOILER.

FIG. 1756.

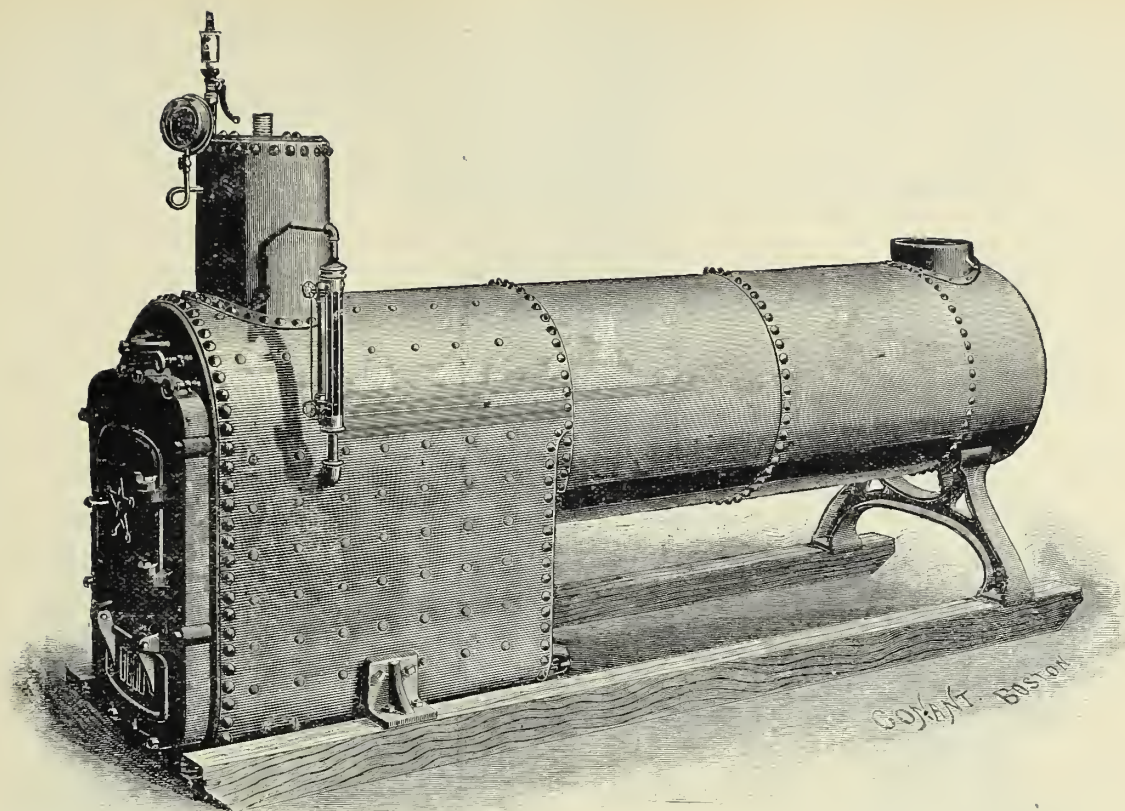


HIGH PRESSURE RETURN TUBULAR BOILER.

THESE Boilers are adapted for use with compound engines and where a high working pressure is required. They are double buttstrapped and triple riveted, the heads braced with solid crowfoot braces, ample in number and size for the pressure required. Prices and specifications furnished on application. No standard sizes are adopted, as the conditions of use vary so much that it is difficult to adopt a standard list meeting all requirements.

SPECIFICATIONS.

Size number, -	1	1½	2	3	4	4½	5	6	7	7½	8	9	10	10½	11	12	13	14	15	16	17
Horse power, -	10	12	12	15	20	20	25	30	35	35	40	45	50	60	60	70	80	90	100	125	150
Heating surface, square feet, -	154	170	184	226	290	300	375	446	530	602	600	675	730	910	900	1030	1172	1296	1377	1660	1770
Grate surface, square feet, -	7½	9	9	10½	10½	12¼	13	14¾	16½	16½	16	18	18	20¼	20	22½	22½	24¾	33	36	36
Diameter of boiler, in inches, -	30	30	36	36	36	42	42	44	44	44	48	48	54	54	60	60	60	66	66	72	72
Length of tubes, in feet, -	7	8	7	8	10	8	10	10	10	12	14	14	12	15	12	14	16	15	16	16	18
Number of tubes, 3 inches diameter, -	20	25	28	28	38	38	46	46	46	52	52	52	64	64	82	82	98	98	98	120	120
Thickness of shell of boilers, -	¼	¼	¼	¼	¼	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾
Thickness of heads of boilers, -	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾
Diameter of dome, in inches, -	18	18	20	20	20	22	22	24	24	24	28	28	30	30	32	32	32	36	36	36	36
Height of dome, in inches, -	20	20	22	22	22	22	22	24	24	24	28	28	30	30	32	32	32	36	36	36	36
Diameter of stack, in inches, -	14	14	16	16	16	20	20	22	22	22	24	24	26	26	26	28	28	30	30	32	34
Length of stack, in feet, -	28	28	24	28	35	28	35	35	35	40	40	50	40	48	48	48	48	54	54	54	60
Length of grates, in inches, -	36	36	36	36	42	36	42	42	42	48	48	54	48	54	54	60	60	66	66	72	72
Width of grate surface, in inches, -	30	30	36	36	36	42	42	42	42	44	48	48	54	54	60	60	60	66	66	72	72
Size of safety valve, and opening for steam pipe, ins., -	2	2	2	2	2	2½	2½	2½	2½	3	3	3	3	4	4	4	4½	5	5	5	5
Size of feed pipe, inches, -	1	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½
Size of blow-off pipe, inches, -	1	1	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½
Weight boiler, smoke box extension and flue door, -	1577	1865	2196	2370	2801	3284	3835	4277	4484	5448	5654	6408	7021	8460	8793	9886	10924	12655	13314	16254	19257
Weight boiler and fixtures, -	1485	1485	1625	1671	1804	2037	2284	2632	2792	3113	3014	3269	3224	3686	3737	4038	4358	5000	5003	5371	5446
Total boiler and fixtures, -	3662	3350	3821	4041	4605	5321	6089	6909	7636	8541	8668	9677	10245	12146	12530	13924	15282	17655	18317	21625	24703
Weight full front fixtures and fittings, -	1688	1866	2062	2325	2756	3204	3735	4195	4762	5346	5539	6293	6892	8341	8584	9677	10715	12204	12863	15610	18613
Total full front boiler and fixtures, -	3633	3811	4117	4426	4990	5805	6572	7366	8093	8998	9092	10101	10776	12677	13147	14541	15899	18258	18920	22435	25513



CAST FRONT PORTABLE BOILER.

THE cut illustrates the Portable Boiler on skids, or more frequently called "Water-Bottom Boiler," and so generally used as a detached boiler, taking the place of the stationary, no brick work being required. It is made of steel throughout. No brick linings are required in the furnace. All parts exposed to the fire are heating surfaces, and protected by water space around the fire, which forms a perfect safeguard against burning the iron. This water space also secures free circulation of water, and allows all sediment to settle below the fire line. A fusible plug is placed in the crown sheet, which will melt and allow the steam to extinguish the fire in case of low water. In addition to the blow-off valve, hand hole plates are provided in suitable places for cleaning. The fronts are easily removed, giving free access to the flues and fire-box, and are so constructed as to allow for contraction and expansion, thereby preventing cracking, as often occurs. The door liner is not bolted nor riveted to the door, as is usually done, and is easily removed when a new liner is required. The draft door hangs on a hinge, and has a slide damper to more easily regulate the fire. The boiler is well stayed, braced and riveted, and has steel dome.

SPECIFICATIONS.

Size number, - - - - -	0	1	3	4	5	6	7	8	9	10	11	12	13
Horse power, - - - - -	6	8	10	12	15	20	25	30	35	40	45	50	60
Diameter of boiler, inches, - - - - -	26	28	30	32	32	34	36	36	40	40	40	44	44
Length of furnace, inches, - - - - -	34	36	38	38	44	52	52	52	52	60	60	60	60
Height of furnace, inches, - - - - -	29	32	34	38	38	38	40	40	44	44	44	48	48
Width of furnace, inches, - - - - -	21	22	24	26	26	28	30	30	34	34	34	38	38
Number of 3 inch tubes, - - - - -	17	20	22	26	26	30	34	34	40	42	42	48	48
Length of tubes, inches, - - - - -	60	66	72	72	78	90	96	102	102	120	144	138	144
Diameter of stack, inches, - - - - -	12	13	14	15	15	16	18	20	20	20	20	22	22
Length of stack, - feet, - - - - -	18	18	20	20	20	24	24	30	35	35	40	40	40

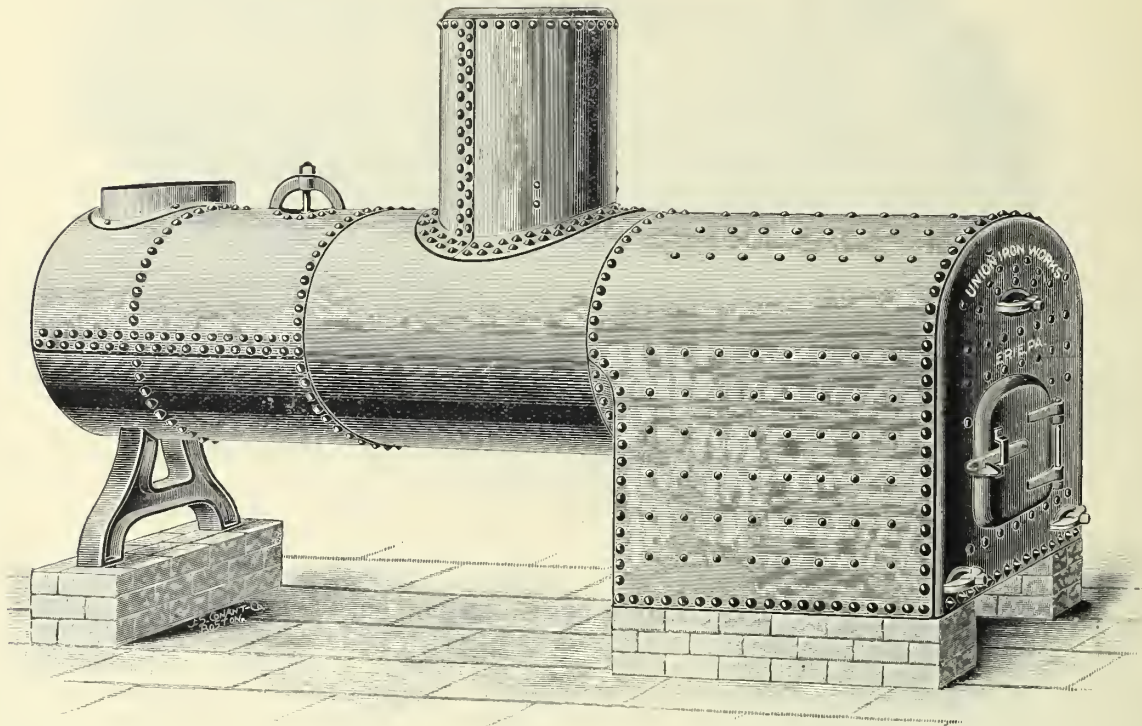
Fixtures comprise: Grates, steam gauge, water gauge, gauge cocks, whistle and pipe, blow off, check, stop and safety valves, smoke-stack and gwy rods.

Water Front and Bottom Portable Boilers.

These boilers are made to the same specifications as the cast front portables, except that the furnace is four inches shorter, due to the water space and projection of casting being taken from its length. There is a slight difference in price.

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FIG. 1758.



LOCOMOTIVE PORTABLE BOILERS.

THESE BOILERS are made in the best manner of steel throughout, with fusible plugs in the crown sheet. The longitudinal seams are double riveted and the firebox thoroughly staybolted.

The bottom ring of the furnace, and door ring, are made of two by three inch wrought iron bars, giving a three inch water space on all sides of the fire, and all parts of the boilers are strongly stayed and braced. The furnaces are large size with ample grate surface, and the boilers are first-class in every respect. The dome may be placed over the firebox of the boiler instead of upon the barrel, if desired.

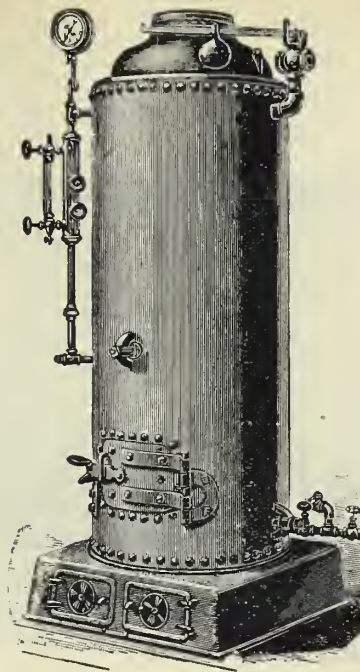
Fixtures comprise: grates, steam gauge, water gauge, gauge cocks, whistle and pipe, safety valve, blow-off valve, check and stop valves, smoke stack and guys.

SPECIFICATIONS.

WITH WATER FRONT AND OPEN BOTTOM.

Size number,	4	5	6	7	8	9	10	11	12	13	14	15
Horse power as usually rated,	25	30	35	40	50	60	70	80	90	100	110	125
Diameter of boiler, inches,	40	42	44	44	48	54	56	58	58	62	64	66
Length of furnace, inside, inches,	48	50	50	50	54	60	60	60	60	60	60	60
Width of furnace, inside, inches,	34	36	38	38	42	48	50	52	52	56	58	60
Height of furnace above grates, inches,	33	34	36	36	40	44	44	48	48	50	52	58
Thickness of shell and outside of firebox, inches,	9 32	9 32	9 32	9 32	5 16	5 16	11 32	11 32	11 32	3 8	3 8	3 8
Thickness of furnace plate, inches,	5 16	5 16	5 16	5 16	5 16	5 16	5 16	5 16	5 16	5 16	5 16	5 16
Thickness of tube sheets, inches,	3 8	3 8	3 8	3 8	3 8	3 8	3 8	3 8	3 8	3 8	3 8	7 16
Number of tubes, three inches diameter,	34	40	44	44	54	60	67	76	76	90	100	108
Length of tubes, inches,	96	96	102	120	126	132	144	144	168	168	168	180
Diameter of dome, inches,	22	22	26	26	26	30	30	32	32	32	36	36
Height of dome, inches,	24	24	28	28	28	34	34	36	36	40	40	40
Diameter of stack, inches,	18	30	20	20	22	24	26	26	26	30	30	32
Length of stack, feet,	24	24	30	36	36	36	40	40	50	50	50	50
Weight of boiler without fixtures, approximate,	6300	6900	7600	8100	9000	11000	12800	14000	15000	16500	17700	18400
Weight of fixtures, approximate,	1150	1250	1400	1500	1600	1850	2000	2150	2400	2600	2800	3000
Weight, complete, approximate,	7450	8150	9000	9600	10600	12850	14800	16150	17400	19100	20500	21400

FIG. 1759.



VERTICAL BOILERS.

THE Vertical Boilers are made of open hearth homogeneous steel plates, with wrought iron door rings and with ogee flanges forming the connection of the fire box to the shell. The longitudinal seams of boilers 36 inches in diameter and larger, are double riveted.

Boilers 24, 30 and 36 inches in diameter have two hand holes in the water leg around firebox, and larger sizes have three, with the same number at the level of the crown sheet.

Fixtures and fittings comprise: Base, grates, hood, steam gauge, water gauge, safety valve, blow-off valve, check valve and stop valve for feed. Hoods are not required or included with the submerged tube style of vertical boilers.

SPECIFICATIONS.

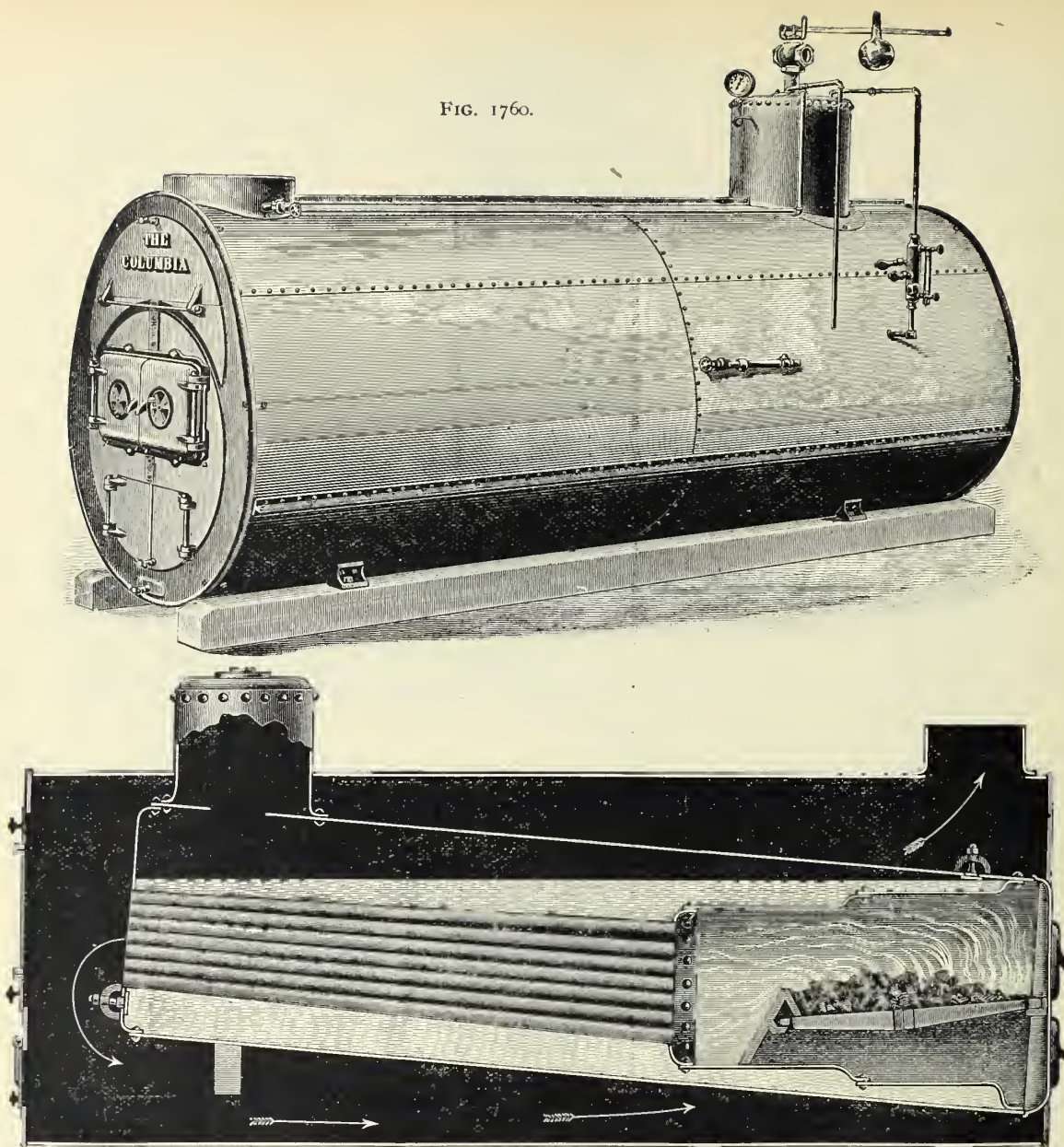
Size number,	1	2	3	4	5	6	7	8	9	10	11
Horse power, as usually rated,	6	8	10	12	15	20	25	30	40	50	60
Diameter of boiler, inches,	30	30	30	36	36	36	42	42	48	48	54
Height of boiler, inches,	57	66	72	72	84	100	84	100	102	120	108
Diameter of furnace, inches,	25	25	25	31	31	31	37	37	43	43	48
Height of furnace, inches,	27	27	27	27	27	27	27	27	30	30	30
Thickness of shell, inches,	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Thickness of furnace plate, inches,	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Thickness of heads, inches,	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
Length of tubes, inches,	30	39	45	45	57	73	57	73	72	90	78
Number of 2 inch tubes,	49	51	53	68	68	68	109	109	149	149	201
Weight of boiler without fixtures, pounds,	1200	1300	1400	1780	2000	2350	2700	3200	4700	5300	6300
Weight of boiler fixtures, pounds,	525	555	525	670	700	700	1000	1000	1700	1700	1800
Weight complete, about, pounds,	1725	1855	1925	2450	2700	3050	3700	4200	6400	7000	8100

SPECIFICATIONS OF VERTICAL BOILERS, WITH SUBMERGED TUBES.

Size number,	1	2	3	4	5	6	7	8	9	10	11
Horse power, as usually rated,	6	8	10	12	15	20	25	30	40	50	60
Diameter of boiler, inches,	30	30	30	36	36	36	42	42	48	48	54
Height of boiler, inches,	69	75	81	75	84	96	90	96	108	120	114
Diameter of furnace, inches,	25	25	25	31	31	31	37	37	43	43	48
Height of furnace, inches,	27	27	27	27	27	27	27	27	27	27	30
Height of chamber, inches,	18	18	18	18	18	18	24	24	30	30	30
Thickness of shell, inches,	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Thickness of heads, inches,	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
Thickness of furnace and chamber, inches,	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
Length of tubes, inches,	24	30	36	30	39	51	39	45	48	63	54
Number of 2 inch tubes,	49	51	53	68	68	68	109	109	149	149	201
Weight of boiler without fixtures, pounds,	1400	1500	1750	2000	2300	2500	2900	3100	4300	4800	5550
Weight of boiler fixtures, pounds,	500	500	500	700	700	700	1100	1100	1500	1500	2100
Weight complete, about, pounds,	1900	2000	2250	2700	3000	3200	4000	4200	5800	6300	7650

The extension of shell forming base, and an ash pan, will not be furnished with either style boiler unless specified in order. Price will be the same as for cast iron base.

FIG. 1760.



THE "COLUMBIA" COMPOUND BOILER.

THE extraordinary performance of the "Columbia" Boiler, when cased in a portable setting of sheet iron, is so analogous to that of a compound steam engine that we feel warranted in adopting the term of description of its performance. As may be seen by the sectional drawing, the hot gases are passed through the furnace and tubes of the boiler, and are then utilized again by being more slowly drawn through the hot-air chamber or casing surrounding the boiler, passing to the chimney at such a low temperature as to give quick evidence of the saving thereby effected.

SPECIFICATIONS.

Size number,	3	5	7	9	11	13	15
Horse power,	12	20	25	30	40	45	50
Diameter of boiler, inches,	29	32	36	40	42	44	48
Length of boiler, inches,	118	124	139	152	168	170	182
Number of tubes,	19	30	35	43	40	47	54
Diameter of tubes, inches,	2½	2½	2½	2½	3	3	3
Length of tubes, inches,	75	75	90	90	108	108	108
Length of furnace, inches,	45	51	51	66	66	66	78
Size of dome, inches,	16 x 16	18 x 18	20 x 20	22 x 22	22 x 22	26 x 26	28 x 28
Length of casing, inches,	132	138	155	168	188	188	202
Width of casing, inches,	37	40	46	50	52	54	60
Height of casing, inches,	45	48	55	61	64	66	72
Height to top of dome, inches,	60	66	72	82	86	90	100
Diameter of stack, inches,	16	18	20	22	22	24	26
Height of stack, feet,	40	40	40	50	50	50	60
Shipping weight,	5000	5500	6600	8000	9000	10400	12200



THE MARSH STEAM PUMP.

COMPARATIVE ADVANTAGES.

A GREAT deal has been said and written on the superior merits of duplex direct acting steam pumps, which is calculated to deceive operators and purchasers alike. There are some points which escape, seemingly, the observation of engineers in regard to duplex steam pumps. They do not, it is claimed by the designers of the pump illustrated herewith, have two independent pumps. They have in reality only one. If anything gives way or breaks on either pump both are disabled, and as a double number of parts are more liable to break down or give out than one-half that number of parts, it is self-evident that a good single steam pump is more reliable than two pumps so constructed, when one depends entirely on the action of the other for its movements; and what is more important still is the question of economy in the use of steam in the two kinds; the advantage is greatly in favor of the single type of the same capacity, from the fact that the single pump, making only one-half the number of stops, traveling a given number of feet in a given time, and with one-half the waste of steam, and from another fact that all duplex pumps have four long ports or passageways in each cylinder, or eight long ports in the two cylinders, while the single pump has only two ports, and as steam in the ports is of no use in propelling the pistons, the steam wasted in the eight ports in a duplex pump is enormous.

A greater waste of steam occurs in the clearance in the cylinder ends, it is further claimed, than in a single pump, through the uncertainty of the length of stroke, that varies under the slightest change of condition, either in the friction of the stuffing boxes or the slightest variation of pressure. In other words, there are in a duplex pump more than double the number of parts, with double the number of chances to break down; also double the waste in clearance in the cylinders through having double the number of long steam and separate exhaust passages in each cylinder, which makes the direct acting duplex pump by far the most extravagant pump in the use of steam that has ever been designed as a hydraulic motor, especially for light service; and, as proof of this statement, there are many cases on record where a direct acting duplex pump has been applied as a vacuum pump to a non-condensing steam engine, where it has not done much more than get rid of the exhaust steam, as the amount of steam required to run the pump is, in many cases, in excess of the gain of the vacuum produced on the main engine.

USES TO WHICH THE PUMP MAY BE APPLIED.

The sectional view on the following page shows the Marsh Steam Pump, which, from its novel construction, admits of its being successfully applied to the handling of hot water of condensation direct from steam radiating coils of office, factory, public or apartment buildings, dry kilns, dryers of paper mills, clarifiers, evaporators, double or triple effects, pressure vacuum pans, steam jackets of simple, compound, triple or quadruple engines, steam separators, drainage pockets of steam pipes, surface condensers or jet condensers, and feeding the water of condensation in its hottest condition directly to the boiler. It does entirely away with the expense of traps, tank, float and balance steam throttle valves, and is perfectly reliable in returning the condensation, vapor or saturated steam to the boilers in a steady and continuous flow, thereby accelerating the circulation of the steam and increasing the efficiency of the radiation in a heating system, producing a large saving of fuel over all other pumps. It can also be used for many purposes, such as regulating the brine circulation in refrigerating machinery, for the temperation apparatus and beer cooling, and for all other circulating purposes.

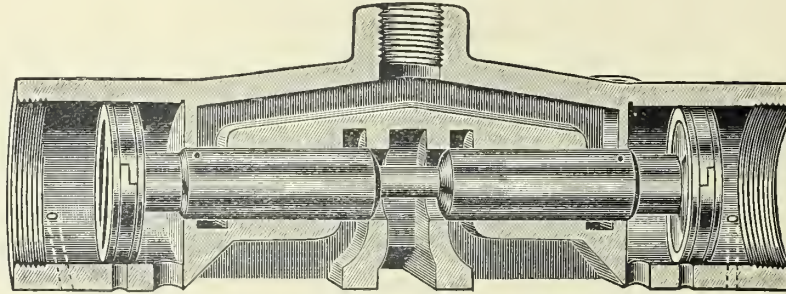
On evaporators and multiple effect vacuum apparatus of all kinds, the vacuum that can be obtained by the Marsh Steam Pump is superior, more excellent and economical than that produced by the best crank fly wheel or duplex pump, and while they are less costly, they are positive and less liable to derangement.

For independent air pump and condenser it has no equal, as it can be attached to any suitable tank to which the exhaust steam and injection water can flow, and the pump requiring no expensive foundation, being self-contained, occupies little floor space, and the governing element of the steam valve is so perfect there is no danger of the pump running away, and never the least jar in the working. Applied to a surface condenser it has no equal.

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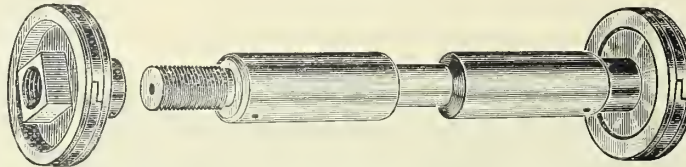
THE MARSH LIVE STEAM ACTUATING AND GOVERNING VALVE.

FIG. 1761.



THE cut given herewith shows a section of steam chest and valve as now made and used in all our pumps. The valves are solid, and in one piece, except one head is screwed on, as shown in cut below.

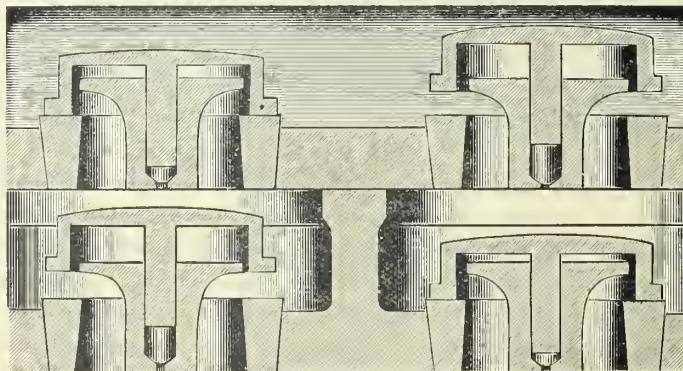
FIG. 1762.



Explanation of the Governing Element.—The governing element of the valve is the enlarged heads, which presents differential areas to the action of steam. The inner area of the valve head is reduced by an amount equal to the cross-sectional area of the valve body, and is acted upon by live steam pressure, which varies with the annular opening of the valve due to linear movement. The outer area of the valve head is larger, and is acted upon by the

THE MARSH PATENT EASY-SEATING WATER VALVE.

FIG. 1763.

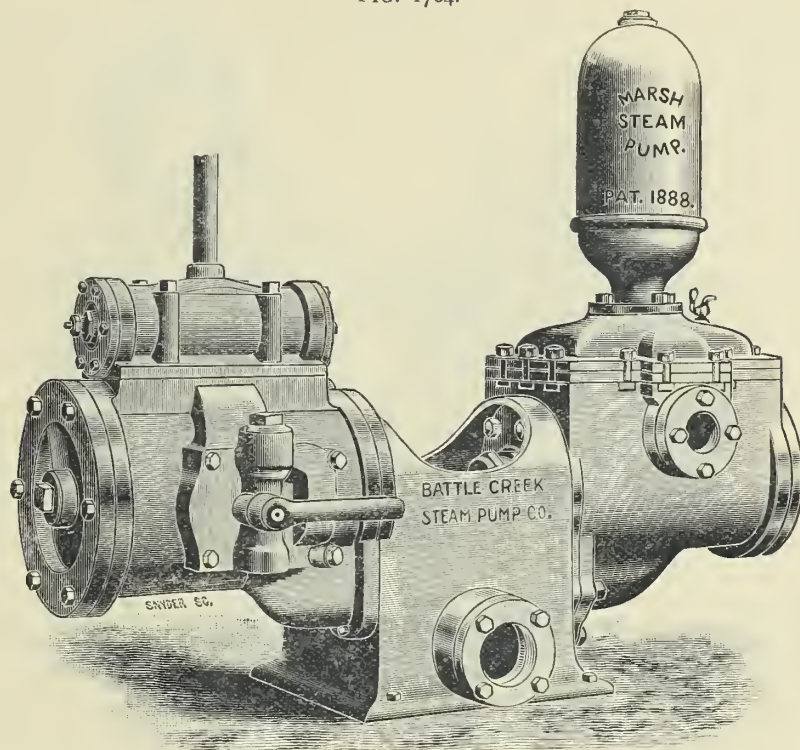


SECTIONAL VIEW OF EASY-SEATING WATER VALVE.

OUR new Water Valve as shown is, like the other features of the Marsh Pump, simplicity itself. It consists of a cup-shaped valve with central guiding pin, and a valve seat and disc cast solid as shown in cut. This disc is slightly larger than the aperture below it in the valve seat, and causes the fluids pumped to be deflected at right angles, just the same as an ordinary water valve does with its lift limited by a stop. The fluids therefore have power to raise the valve as high as the disc only, and for that reason a stop to limit the lift of the water valve is not necessary. This is the only water valve used in a pump that does not strike against a stop in its upward movement. When it closes it does not seat with a harsh abrasive action like other valves, but being partially cushioned on the water between the disc and valve, it seats softly, and we believe it is the most durable and satisfactory water valve ever devised. The waterways are large and the valve has capacity equal to any other. This water valve is secured by letters patent issued February 9, 1892, and is used only in the Marsh Steam Pump.

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FIG. 1764.



THE MARSH STEAM PUMP.

COUNT ITS PARTS.

MAXIMUM OF STRENGTH, SIMPLICITY AND SERVICE.

MINIMUM OF WEIGHT, WEAR AND WASTE.

See table of details on page 882.

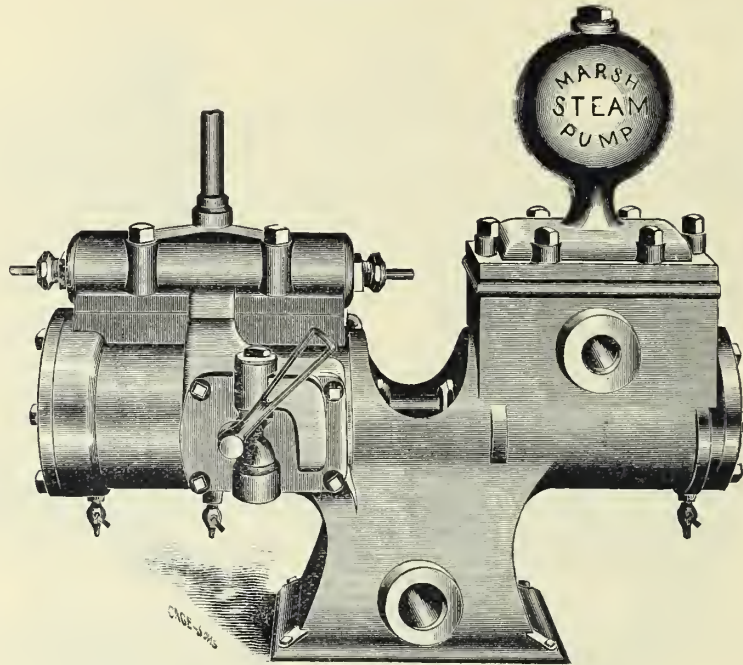
THE Marsh Steam Pump (sizes 150 to 1500 horse power capacity) is new and novel in design, and has all the latest improvements in construction. The base is cast hollow, forming a chamber into which the exhaust from the steam cylinder passes. The suction is connected to this chamber on either side, right or left, and from thence to the water cylinder through the elbow on under side of cylinder. After starting the pump the exhaust deflecting lever may be thrown over, admitting the exhaust steam to this chamber, where it is immediately condensed, raising temperature of the water according to the amount of steam used or labor performed, effecting a corresponding saving of fuel by returning the heat of the steam used to run the pump to the boiler. This centre also forms the base upon which the pump rests. As it is comparatively small, it does not require a large and expensive foundation. Its construction also admits of an interchange of cylinders, so that a combination for any required duty may be made. The same general features are retained in the steam valves as in the smaller sizes, which are of a different pattern. The composition linings in the water cylinders are removable, and can be taken out without disconnecting any of the pipes. The water valves are our new patented noiseless composition valves, which are the only quiet metal valves yet discovered. These pumps are simple in construction, durable and very powerful; the valves are interchangeable. The water ways are large and direct, reducing friction to a minimum. The pump has no outside valve gearing; the steam valve is self-governing and the pump is not injured by breaking suction. It will pump hot or cold water, light or heavy liquids, and although only seven years on the market, there are over 14,000 Marsh Pumps in use to-day on marine, portable, stationary boilers and other duties.

Sizes E, F, G, H, I, L and M are of this pattern as illustrated.

E,	5	x	3	x	6 inches,	-	-	-	150 horse power capacity.
G,	5½	x	3½	x	6 inches,	-	-	-	200 horse power capacity.
F,	6	x	3¾	x	8 inches,	-	-	-	250 horse power capacity.
H,	7	x	4	x	8 inches,	-	-	-	350 horse power capacity.
I,	8	x	5	x	10 inches,	-	-	-	600 horse power capacity.
L,	10	x	6	x	12 inches,	-	-	-	1000 horse power capacity.
M,	12	x	7¼	x	12 inches,	-	-	-	1500 horse power capacity.

PRENTISS TOOL & SUPPLY CO.

FIG. 1765.



THE IMPROVED MARSH STEAM PUMP.

DESIGNED FOR STATIONARY, MARINE OR PORTABLE BOILERS.

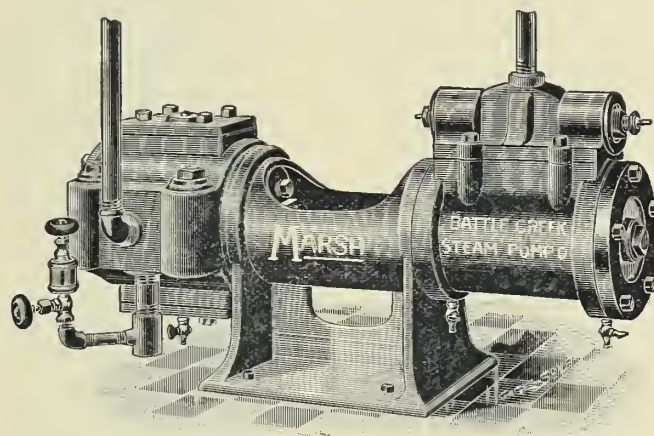
TABLE OF DETAILS.

Size.	Steam Cylinder.	Water Cylinder.	Stroke.	Gallons per Stroke.	Gallons per Minute.	Gallons per Hour.	Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Delivery Pipe.	Floor Space.	Horse Power.	Weight, Pounds.	Price.
B	2½	1¾	2	.0128	3.33	200	¼	¾	¾	½	7 x 12	20	40	\$30.00
BB	3	1¾	2½	.0260	6.66	400	¾	½	1	¾	7 x 16	35	75	50 00
C	4	2¾	3	.0575	10.83	650	¾	½	1¼	¾	10 x 21	60	145	75.00
D	5	3	3½	.1071	16.66	1000	½	¾	1½	1	11 x 23	100	190	100.00
E	5	3	6	.1836	25	1500	½	¾	2	1¼	10 x 32	150	275	150.00
G	5½	3½	6	.2499	33	2000	¾	1	2	1½	12 x 34	200	400	175.00
F	6	3¾	8	.3574	45	2700	¾	1	2½	2	13 x 37	250	375	200.00
H	7	4	8	.4352	58	3500	1	1¼	2½	2	15 x 39	350	525	250 00
I	8	5	10	.85	100	6000	1	1½	3½	2½	18 x 48	600	950	325.00
L	10	6	12	1.46	146	8750	1	1½	4	3	18 x 52	1000	1150	425.00
M	12	7¼	12	2.14	216	13000	1½	2	5	4	19 x 56	1500	1350	525.00
O	16	10	16	5.44	408	25000	3	3½	8	7	24 x 68	2500	3040	750.00

We have discarded many wearing parts found in other pumps, and get our results with what is left.

PRENTISS TOOL & SUPPLY CO.

FIG. 1766.



MARSH AIR COMPRESSOR.

DIRECT, DOUBLE-ACTING, FOR RACKING OFF BEER, AGITATING OILS, SYRUPS AND CHEMICAL PREPARATIONS; ALSO FOR COMPRESSING AIR FOR ELEVATING ACIDS AND OTHER LIQUIDS BY DIRECT AIR PRESSURE.

OUR improved steam valve that possesses absolute actuation and regulation is of especial value on this type of air compressor, as it permits the piston to travel close up to the heads of the air cylinders thus reducing clearance to minimum, and therefore combining greatest economy in the use of steam with most efficient work.

The pistons are specially designed, combining lightness, strength and durability. The air valves are made of gun metal and are placed so close to the piston bore that valve port clearance is almost entirely eliminated.

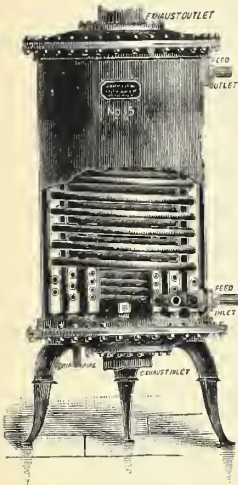
TABLE OF DETAILS OF MARSH AIR COMPRESSORS.

No.	Steam Cylinder Inches	Air Cylinder Inches.	Stroke. Inches.	Cubic feet free air per revolution.	Cubic feet of air per minute.	Dead pressure, Steam at 80 pounds.	Live pressure, Steam at 80 pounds.	Cold water jacket	Price.
1	2½	2½	2	.0056	2	40	15	without.	\$30 00
2	3	3	2½	.0102	3	40	15	without.	50 00
3	4	3½	5½	.0339	7	70	25	without.	75 00
4	5	6	6	.1963	20	45	25	without.	150 00
5	5	6	6	.1963	20	45	25	with.	150 00
6	5½	6	6	.1963	20	55	30	with.	150 00
7	5½	6	6	.1963	20	55	30	without.	150 00
8	6	6	6	.1963	20	60	35	without.	175 00
9	6	6	6	.1963	20	60	35	with.	175 00
10	6	8	8	.4653	45	40	20	without.	200 00
11	6	8	8	.4653	45	40	20	with.	200 00
12	7	8	8	.4653	45	50	25	without.	250 00
13	7	8	8	.4653	45	50	25	with.	250 00
14	8	8	12	.6979	60	60	35	with.	350 00
15	10	8	12	.6979	60	95	70	with.	400 00
16	12	8	12	.6979	60	110	85	with.	450 00

PRENTISS TOOL & SUPPLY CO.

FEED WATER HEATER.

FIG. 1767.



The National Heater consists of single and double coils of seamless drawn copper or brass tubes in an iron shell. The feed water for the boiler, passing through the coil, is heated by the exhaust steam from the engine.

It is a plain common sense Heater, and carries with it the following valuable points:—The liability to leaky joints is wholly obviated by the coil, which takes care of all contraction and expansion. The flow of the feed water is free and easy. The trouble from back pressure on the engines is obviated as the exhaust passage through the Heater is from four to ten times larger than the exhaust pipe from the engine. It will deliver feed water at 206° to 212° for ten hours a day and without one ounce of back pressure: and last but not least, it is the lowest priced Heater in the market.

A single coil of brass tube is used in all Heaters up to No. 10 inclusive: Nos. 12 to 30 have two coils; Nos. 40 and 50, three coils; Nos. 60 and 80 have four coils; Nos. 100, 125 and 150 have five coils, and Nos. 200 and 250 have six coils. These Heaters have special brass fittings for connecting the coils into one flow of feed water, both at the inlet and outlet. Each coil is carefully secured, and great care is taken to make a Heater that shall be low priced, but at the same time economical and durable. All coils are tested to 200 lbs. pressure, and are guaranteed to stand 600 lbs.

No. 05 to 2½ exhaust in and out at top. No. 3, and above, exhaust in at bottom and out at top.

Size of exhaust pipe can be varied to suit engine.

Never reduce the size of the drip pipe, and always keep it open.

In connection with a condenser, it will heat water to 130° or 140°, increasing the vacuum. It is the best Heater ever used on a steamboat, either with or without a condenser.

We also manufacture special Heaters for use in Hotels, Hospitals, Breweries, Laundries, Dye Houses, etc., and shall be pleased to give full information when desired.

Estimates given on Heaters for special location or special purposes.

DETAILS AND DIMENSIONS OF THE NATIONAL FEED-WATER HEATER.

No.	Horse Power.	Diameter of Feed Pipe.	Diameter of Exhaust Pipe.	Outside Dimensions of Heater.		Weight.	Price.
				Height.	Diameter.		
		Inches.	Inch.	Inch.	Inch.	Lbs.	
.05	5	½	2	10	7	30	\$ 15 00
1	10	½	2	12	11	50	20.00
1 ½	15	½	2 ½	17	11	65	25.00
2	20	¾	2 ½	18	16	200	35.00
2 ½	25	1	3	20	19	250	45.00
3	30	1	4	22	20	330	55.00
4	40	1	4	35	20	375	65.00
5	50	1	4	41	20	420	80.00
6	60	1	4	46	20	455	100.00
8	80	1	4	51	20	515	120.00
10	100	1 or 1 ¼	5	56	22	775	140.00
12	125	1 ¼ or 1 ½	5	57	22	850	175.00
15	150	1 ½	8	60	26	1000	220.00
20	200	1 ½ or 2	8	70	26	1250	280.00
25	250	1 ½ or 2	8	81	29	1310	340.00
30	300	2	8	89	29	1400	400.00
40	400	2 or 2 ½	10	88	36	1900	500.00
50	500	2 or 2 ½	10	102	36	2000	600.00
60	600	2 ½ or 3	12	101	42	2600	700.00
70	700	3	12	105	42	2800	1000.00
80	800	3	12	110	42	3000	1400.00
100	1000	3 or 4	18	117	56	4750	1600.00
125	1250	4	18	133	56	5550	2000.00
150	1500	4	18	143	56	6000	2500.00
200	2000	4 ½ or 5	18	138	65	8000	3000.00
250	2500	5	18	153	65	8500	3750.00

Sizes No. 05 to 2½ have exhaust inlet and outlet in top head; sizes No. 3 and over have inlet in bottom and outlet in top heads, unless ordered otherwise.

Size of exhaust varied to suit requirements of engine. Two or more exhausts in bottom head if necessary.

FIG. 1768.



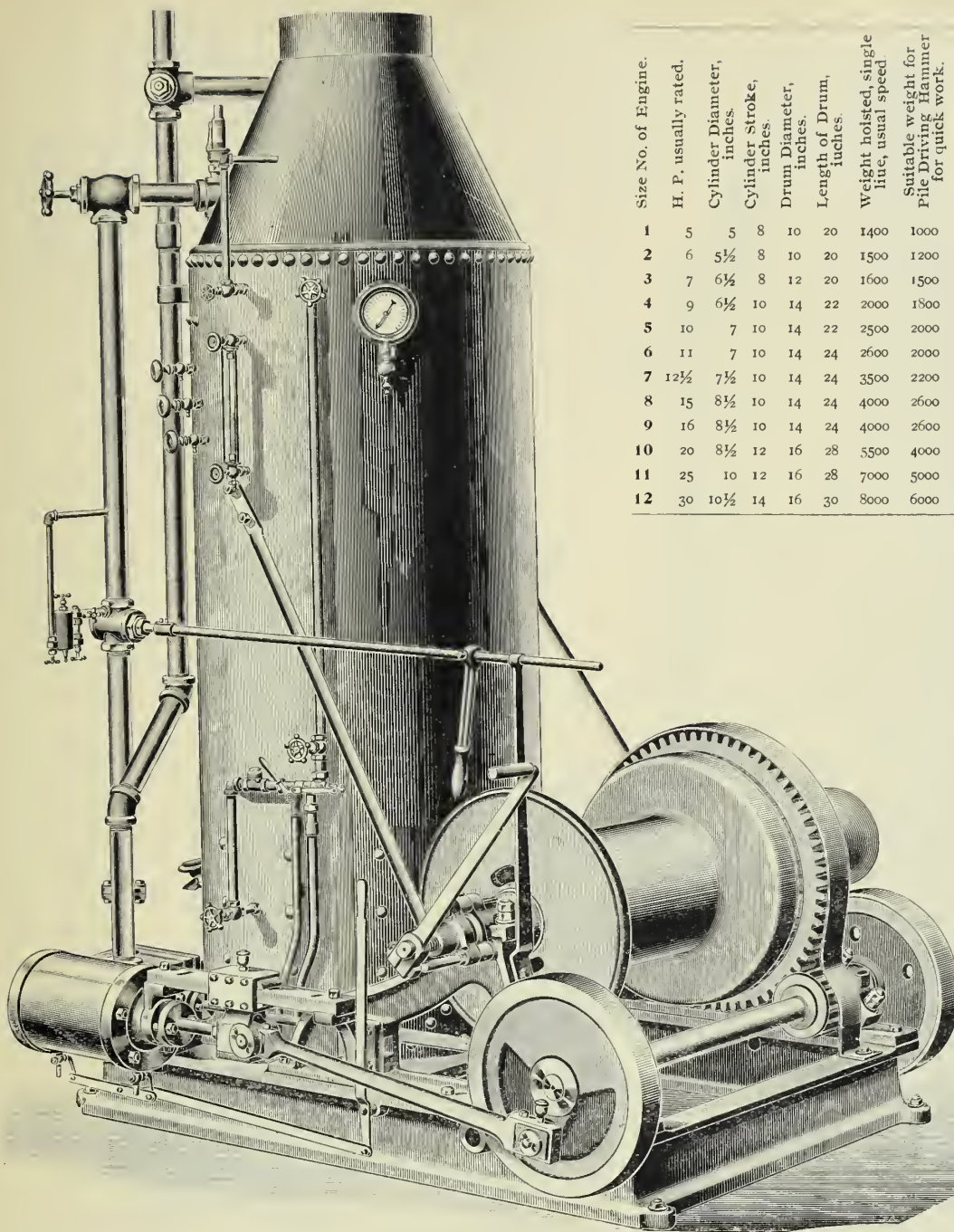
THE BROOKS FLEXIBLE AND ADJUSTABLE FLUE CLEANERS.

1 ½ inches,	-	\$2.00	2 ½ inches,	-	\$2.50	3 ½ inches,	-	\$3.50	5 inches,	-
2 "	-	2.00	3 "	-	3.00	4 "	-	4.00	6 "	-

They are flexible to adjust. They fit the flue perfectly. They leave no scale or warts in the flues. They are made of drawn steel made especially for this use and the temper cannot be drawn out, thereby making them lasting and durable, and indestructible when used for cleaning hot flues; as this Cleaner is used it wears itself sharp by coming in contact with the sides of the flues.

To adjust the Cleaner do not try to lengthen it, but remove the key at the end and turn the nut until the desired size is reached, then insert the split key through burr and through the hollow shaft. But as the back end of the tubes fill up with scale faster than the front ends it is necessary to adjust the Cleaner so it will go through easily for the first few times using, and then let it out gradually until the standard size is obtained.

Fig. 1169.



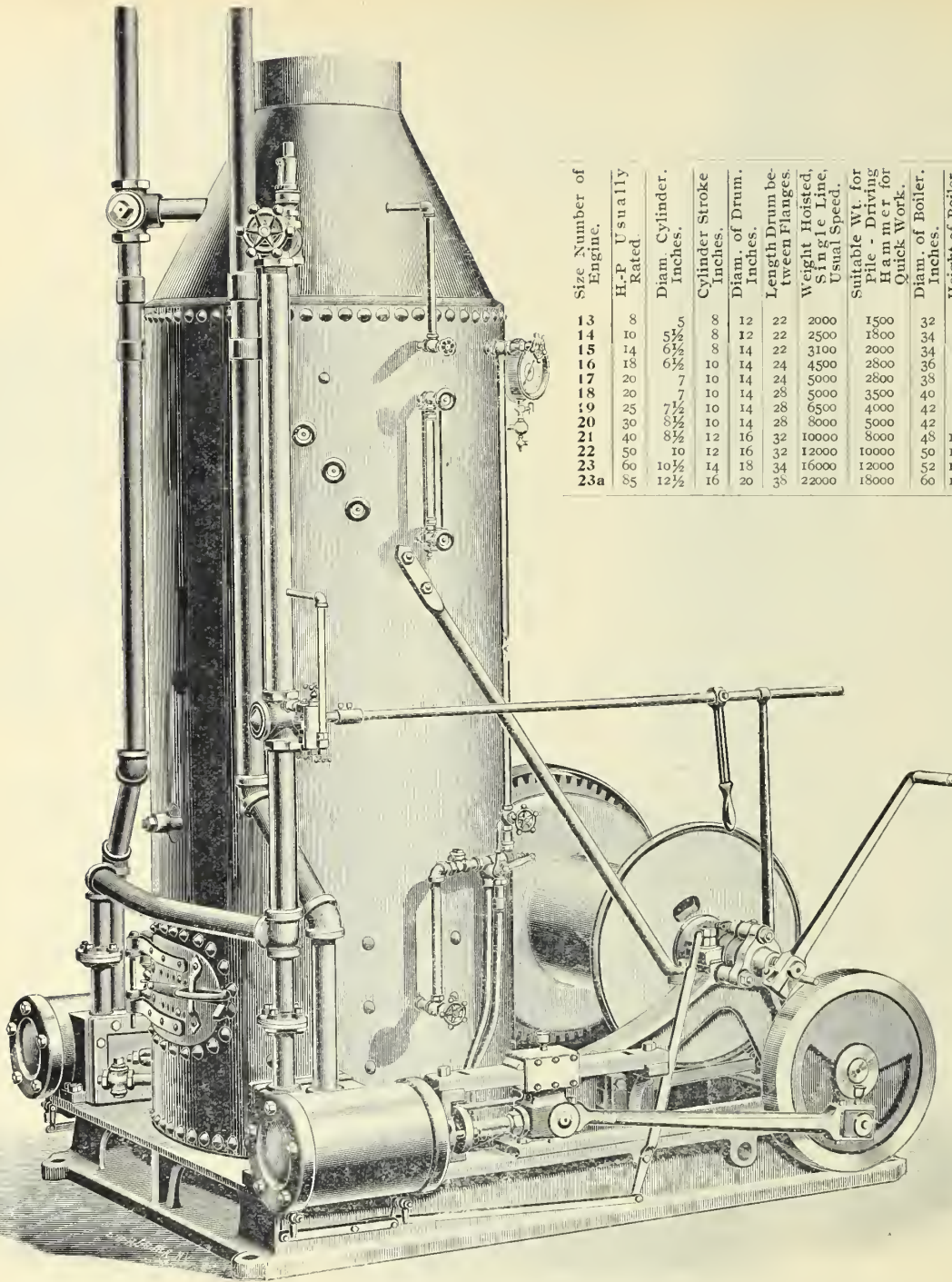
Size No. of Engine.	H. P. usually rated.	Cylinder Diameter, inches.	Cylinder Stroke, inches.	Drum Diameter, inches.	Length of Drum, inches.	Weight hoisted, single line, usual speed.	Suitable weight for Pile Driving Hammer for quick work.	Boiler, Diameter of Shell, inches.	Boiler, Height of Shell, inches.	Boiler, No. of 2 inch Tubes.	Estimated Shipping Weight with Boiler complete.	Price, Engine and Boiler, complete.	Price, Engine, including Foot Brakes.	Extra Cost for Iron Dock Wheels.
1	5	5	8	10	20	1400	1000	28	68	40	3600			
2	6	5½	8	10	20	1500	1200	28	68	40	3650			
3	7	6½	8	12	20	1600	1500	28	68	40	3900			
4	9	6½	10	14	22	2000	1800	30	78	50	4800			
5	10	7	10	14	22	2500	2000	32	80	55	5100			
6	11	7	10	14	24	2600	2000	34	84	60	5400			
7	12½	7½	10	14	24	3500	2200	36	84	65	6100			
8	15	8½	10	14	24	4000	2600	36	84	65	6500			
9	16	8½	10	14	24	4000	2600	38	90	77	6800			
10	20	8½	12	16	28	5500	4000	40	90	85	8800			
11	25	10	12	16	28	7000	5000	42	96	90	9800			
12	30	10½	14	16	30	8000	6000	42	96	90	10500			

Single Cylinder, Patent Friction Drum Hoisting Engine, WITH BOILER AND FIXTURES COMPLETE.

Specially adapted for pile driving, contractors, railroads, bridge builders, docks, coal yards, stevedores, ships, quarries, running centrifugal pumps and general hoisting purposes.

EVERY ENGINE TESTED AND GUARANTEED.

FIG. 1170.



Size Number of Engine.	H-P Usually Rated	Diam. Cylinder. Inches.	Cylinder Stroke Inches.	Diam. of Drum. Inches.	Length Drum between Flanges.	Weight Hoisted, Single Line, Usual Speed.	Suitable Wt. for Pile Driving Hammer for Quick Work.	Diam. of Boiler. Inches.	Height of Boiler. Inches.	Number of 2-inch Boiler Tubes.	Estimated Shipping Wt. with B'ly Complete.	Price of Engine & Boiler Ratchets & Pawls & Fixtures Complete.	Price of Engine & Boiler Complete including Foot Brakes.
13	8	5	8	12	22	2000	1500	32	80	57	5200		
14	10	5½	8	12	22	2500	1800	34	84	60	5450		
15	14	6½	8	14	22	3100	2000	34	84	60	5800		
16	18	6½	10	14	24	4500	2800	36	84	65	7200		
17	20	7	10	14	24	5000	2800	38	90	77	7800		
18	20	7	10	14	28	5000	3500	40	90	85	8000		
19	25	7½	10	14	28	6500	4000	42	96	90	9000		
20	30	8½	10	14	28	8000	5000	42	96	90	9400		
21	40	8½	12	16	32	10000	8000	48	102	142	14500		
22	50	10	12	16	32	12000	10000	50	102	155	18500		
23	60	10½	14	18	34	16000	12000	52	108	160	22000		
23a	85	12½	16	20	36	22000	18000	60	120	200	28000		

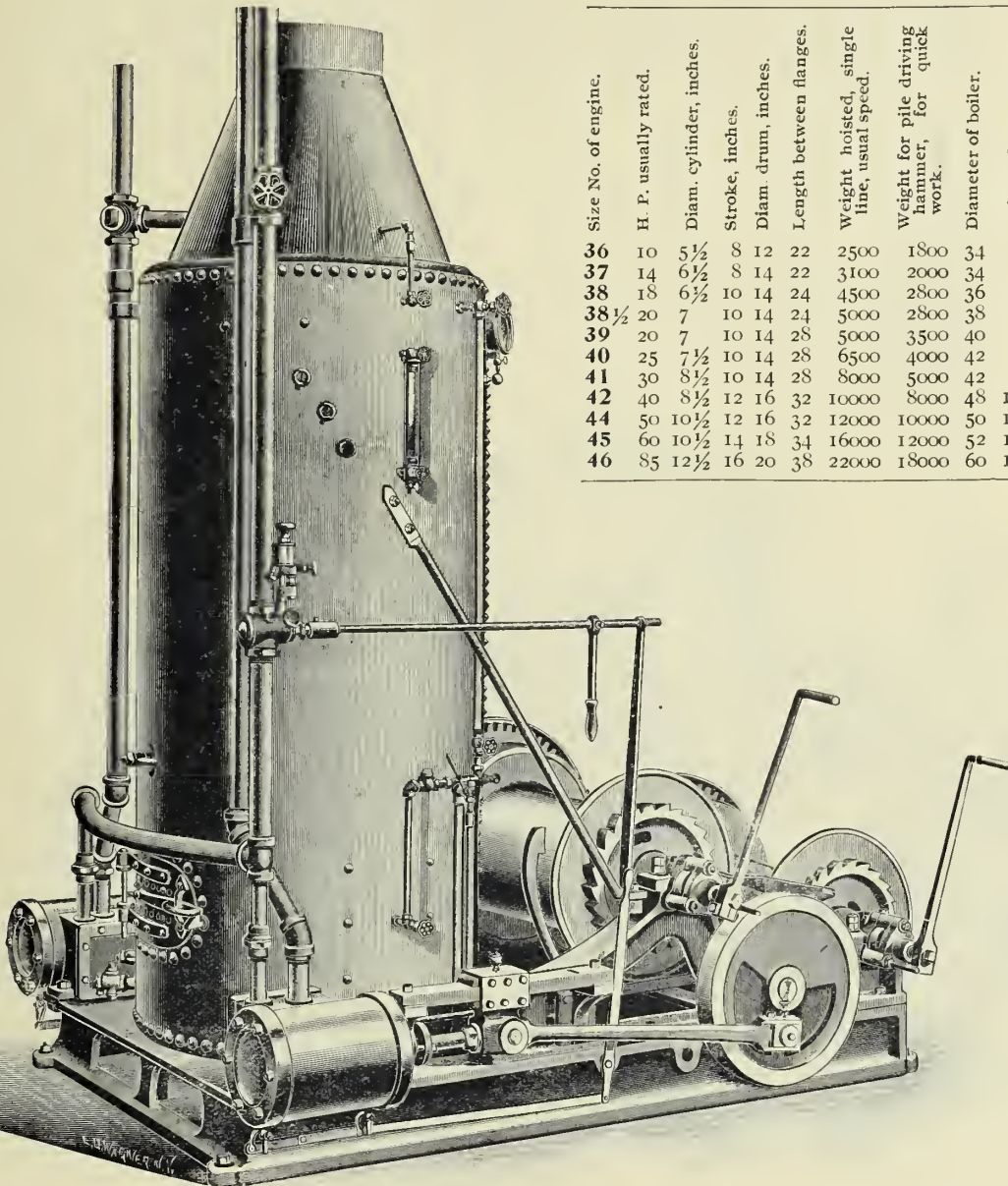
Double Cylinder Patent Friction Drum Hoisting Engine, WITH BOILER AND FIXTURES COMPLETE.

Specially adapted for pile driving, contractors, railroads, bridge builders, docks, coal yards, stevedores, ships, quarries and general hoisting purposes.

EVERY ENGINE TESTED AND GUARANTEED.

PRENTISS TOOL & SUPPLY CO.

FIG. 1171.



Size No. of engine.	H. P. usually rated.	Diam. cylinder, inches.	Stroke, inches.	Diam. drum, inches.	Length between flanges.	Weight hoisted, single line, usual speed.	Weight for pile driving hammer, for quick work.	Diameter of boiler.	Height of boiler.	Number of 2 inch tubes.	Estimated shipping weight with boiler complete.	Price of engine and boiler, ratchets and pawls and fixtures complete.	Price of engine and boiler complete, including foot brakes.
36	10	5½	8	12	22	2500	1800	34	84	60	6500		
37	14	6½	8	14	22	3100	2000	34	84	60	7000		
38	18	6½	10	14	24	4500	2800	36	84	65	8200		
38½	20	7	10	14	24	5000	2800	38	90	77	9000		
39	20	7	10	14	28	5000	3500	40	90	85	9800		
40	25	7½	10	14	28	6500	4000	42	96	90	10500		
41	30	8½	10	14	28	8000	5000	42	96	90	11500		
42	40	8½	12	16	32	10000	8000	48	102	142	20500		
44	50	10½	12	16	32	12000	10000	50	102	155	21500		
45	60	10½	14	18	34	16000	12000	52	108	160	24000		
46	85	12½	16	20	38	22000	18000	60	120	200	29000		

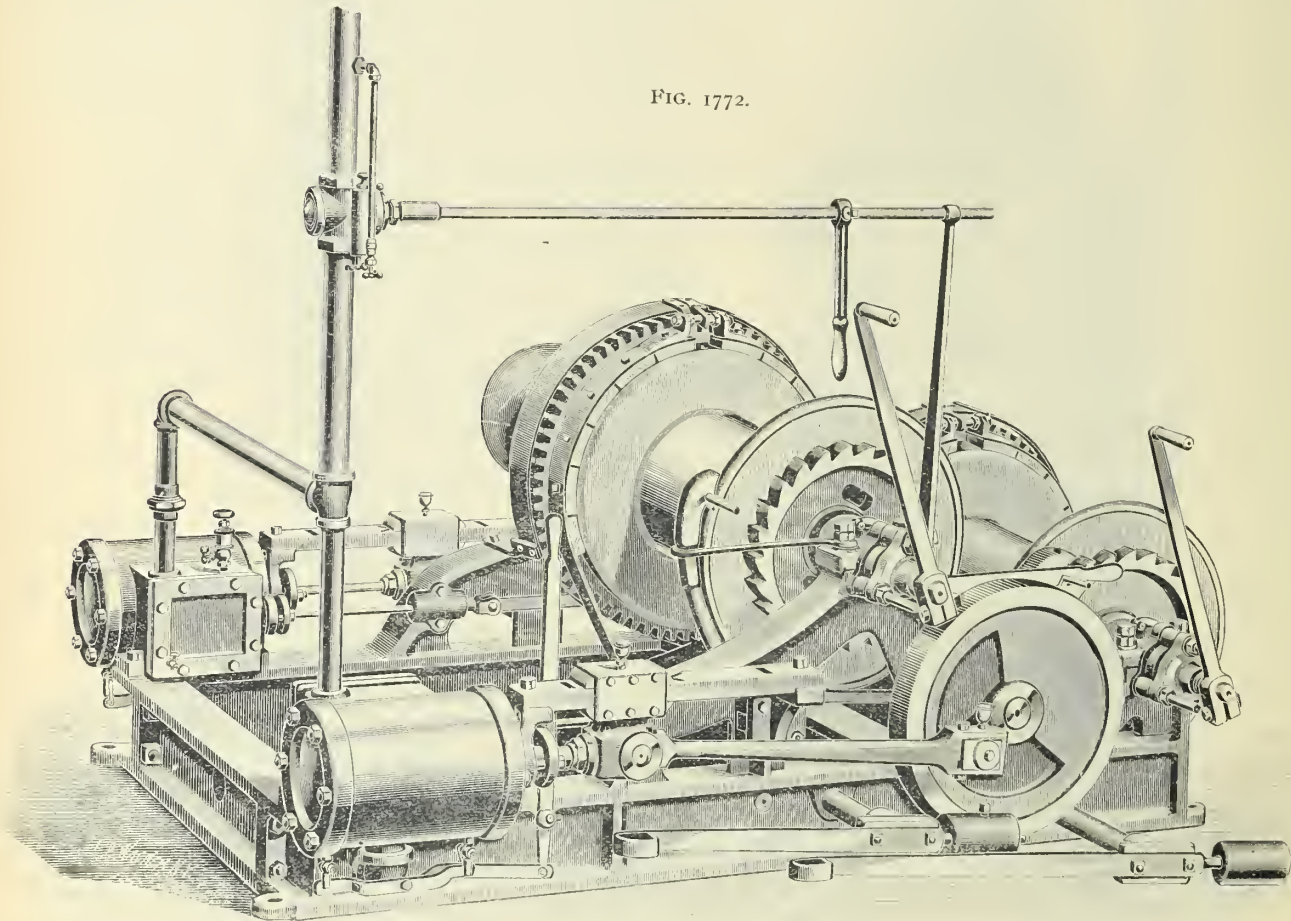
Standard Double Cylinder, Double Patent Friction Drum, Double Winch Hoisting Engine.

WITH RATCHETS AND PAWLS, WITH BOILER AND FIXTURES COMPLETE.

Specially adapted for quarries, bridge building, pile driving, dock building, contractors' use and general hoisting.

Size No. of Engine.	Horse Power.	Cylinder Diameter, Inches.	Cylinder Stroke, Inches.	Diameter of Drums, Inches.	Length of Drums, Inches.	Weight Hoisted, Single Line, in Pounds.	Suitable Weight Pile Driving Hammer for quick work.	Estimated Shipping Weight	Price of Engine complete with Ratchet and Pawls.	Price of Engine complete with Ratchet, Pawls and Foot Brakes.	Extra for Cast Iron Dock Wheels.
24	10	5½	8	12	16	2500	1600	4000	\$		
25	14	6½	8	12	16	3000	2000	4200	\$		
26	18	6½	10	14	18	4000	2400	5200			
27	20	7	10	14	18	5000	3000	5500			
28	25	7½	10	14	24	6500	4000	6000			
29	30	8½	10	14	24	8000	5000	6650			
30	40	8½	12	16	30	10000	8000	10500			
31	45	9½	12	16	30	11000	8500	11000			
32	50	10	12	16	30	12000	9000	13000			
33	60	10½	14	16	32	16000	10000	18000			

FIG. 1772.



Double Cylinder, Double Patent Friction Drum and Winch Hoisting Engine, with Ratchets and Pawls.

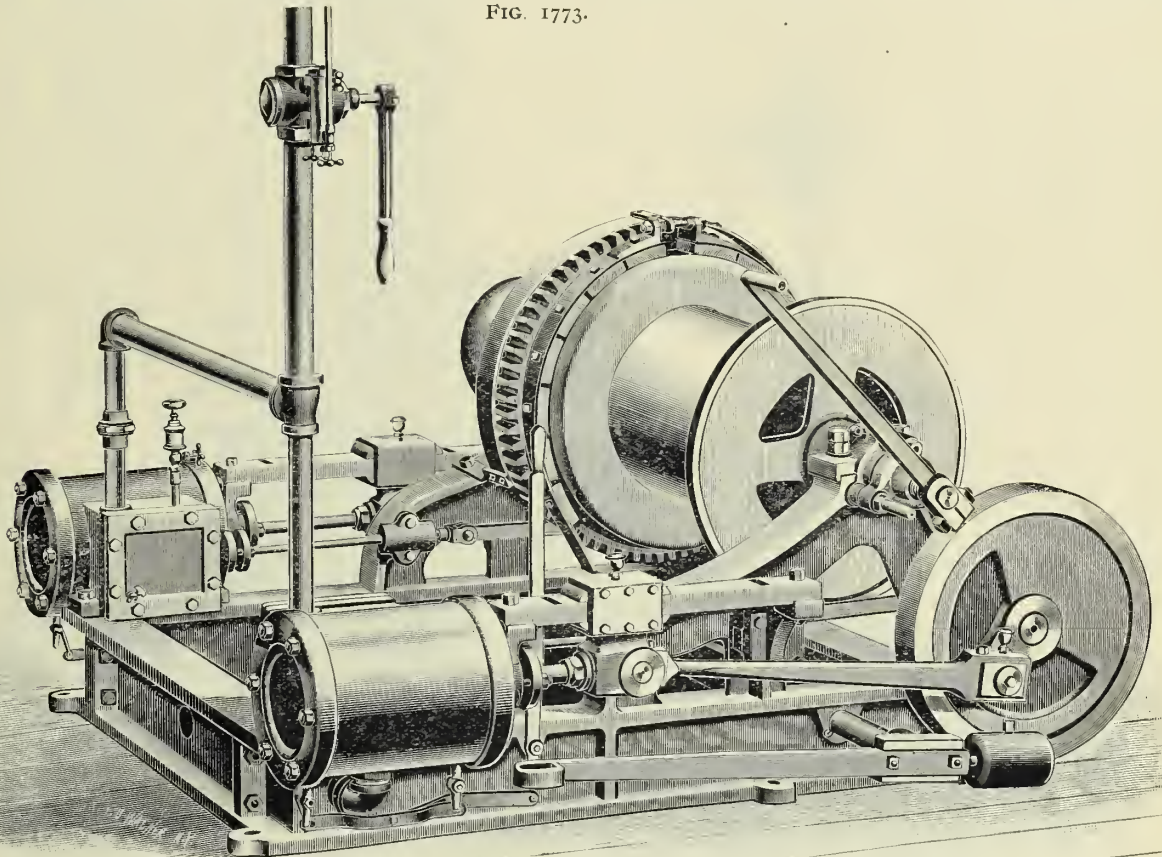
WITH OR WITHOUT FOOT BRAKES, AND WITHOUT BOILER.

Specially adapted for quarries, bridge building, contractors, lighters, railroads, etc.

PRENTISS TOOL & SUPPLY CO

Size No. of Engines.	H. P. Usually Rated.	Dimension of Cylinders.		Dimension of Hoisting Drums.		Weight hoisted, single line in lbs.	Estimated shipping weight, lbs.	Price of Engine complete without Boiler.	Price of Engine complete without Boiler, with foot brakes.	Extra for cast iron dock wheels.
		Diameter Inches.	Stroke Inches.	Diameter Inches.	Length Inches.					
47	8	5	6	10	14	1600	1600			
48	10	5½	8	10	16	2500	2350			
49	14	6½	8	12	16	3000	2600			
50	18	6½	10	14	18	4000	3150			
51	20	7	10	14	18	5000	3250			
52	25	7½	10	14	24	6500	4100			
53	30	8½	10	14	24	8000	4600			
54	40	8½	12	16	30	10000	8750			
55	50	10	12	16	30	12000	9100			
56	60	10½	14	18	32	16000	9800			

FIG. 1773.



Double Cylinder, Single Patent Friction Drum and Winch Hoisting Engine.

WITH OR WITHOUT FOOT BRAKE AND WITHOUT BOILER.

Specially adapted for warehouses, steam lighters, bridge building, contractors, railroads, barges, steamboats, sailing vessels and general hoisting.

PRENTISS TOOL & SUPPLY CO.

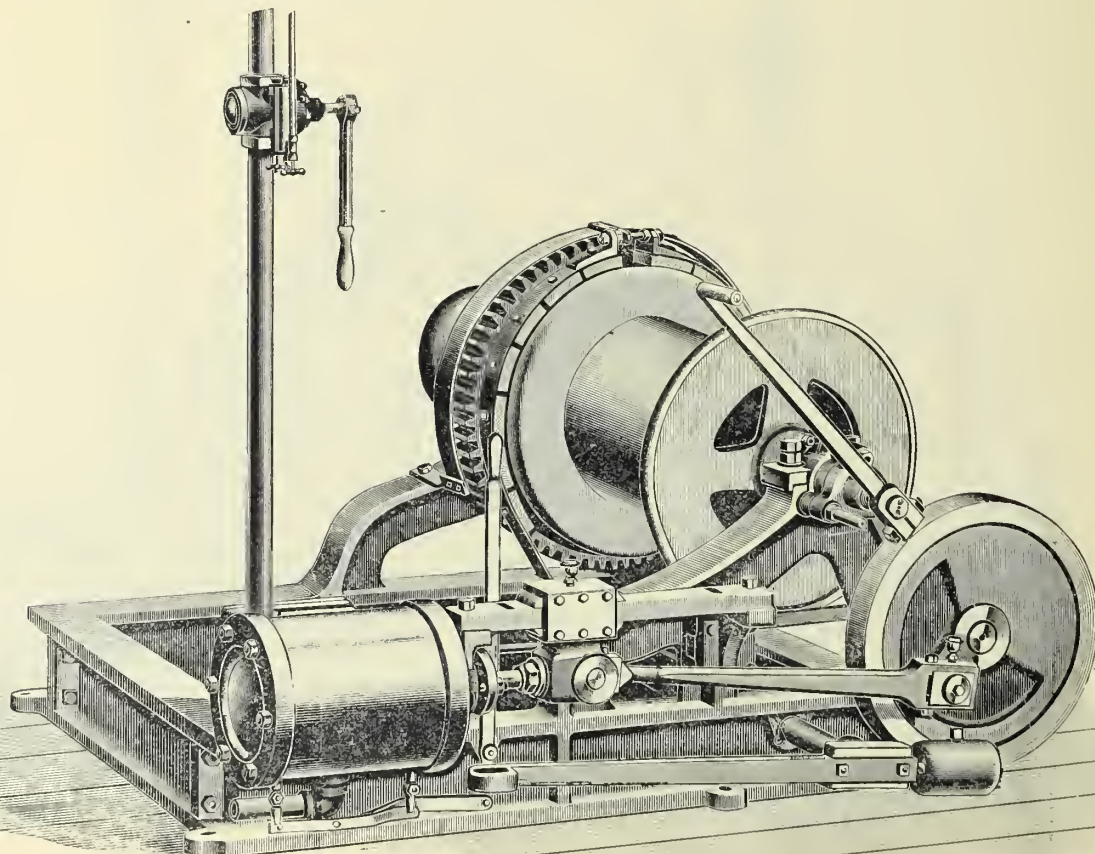
Specially adapted for coal hoisting, steam lighters, vessels, quarries, docks, warehouses, railroads, contractors and general hoisting.

This engine is very desirable where a small, simple and compact engine is desired and where boilers are already in place, or where an independent boiler is used to run one or more engines, rock drills or other machinery. They are very convenient where frequent moving is necessary, and, in fact, for all purposes where a light, independent hoisting engine can be used. Every engine has a winch-head on the drum shaft and a band fly wheel on the crank shaft. Foot brakes are furnished if desired. Independent boilers and fixtures supplied with these engines.

Reverse Link-Motion Engines furnished without friction drum.
Prices on application.

Size No. of Engine.	Horse Power.	Cylinders.		Will Hoist with Single Line, in Pounds.	Diameter of Hoisting Drums, Inches.	Estimated Shipping Weight, Pounds.
		Diameter, Inches.	Stroke, Inches.			
57	4	5	6	800	8	1000
58	5	5	8	1200	10	1500
59	6	5½	8	1400	12	1600
60	8	6½	10	1700	14	2000
61	10	7	10	2000	14	2300
62	12½	7½	10	2500	14	2500
63	16	8½	10	3200	14	3000
64	20	8½	12	5000	16	4200
65	25	10	12	5500	16	5000
66	30	10½	14	7000	16	5500

FIG. 1774.

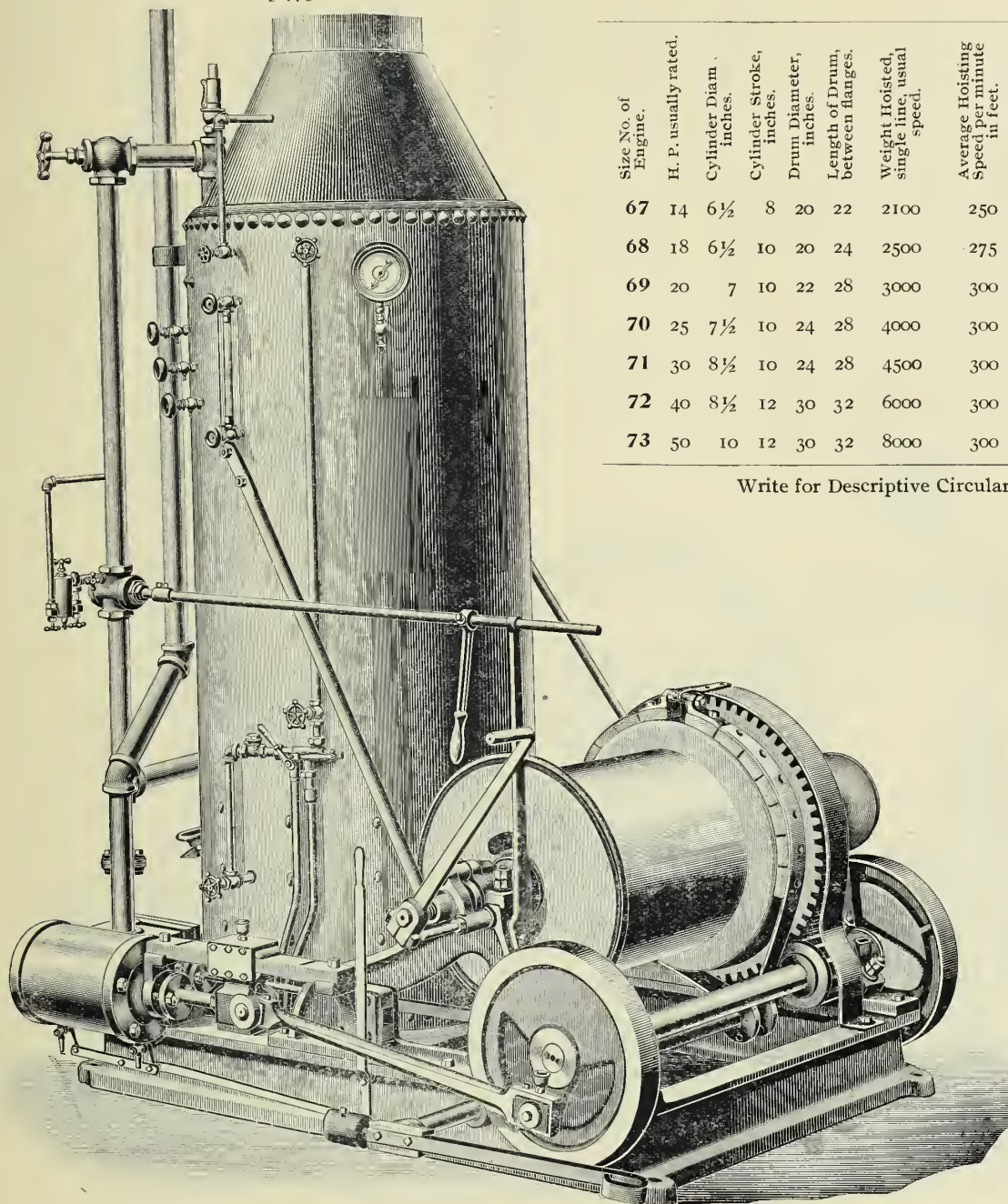


Single Cylinder Single Patent Friction Drum Single Winch Hoisting Engine.

WITH FOOT BRAKE WITHOUT BOILER.

PRENTISS TOOL & SUPPLY CO.

FIG. 1775.



Size No. of Engine.	H. P. usually rated.	Cylinder Diam. inches.	Cylinder Stroke, inches.	Drum Diameter, inches.	Length of Drum, between flanges.	Weight Hoisted, single line, usual speed.	Average Hoisting Speed per minute in feet.	Boiler Diam., inches.	Height of Boiler, inches.	Boiler, No. 2 inch Tubes.	Estimated Shipping Weight with Boiler complete
67	14	6½	8	20	22	2100	250	34	84	60	6500
68	18	6½	10	20	24	2500	275	36	84	65	8000
69	20	7	10	22	28	3000	300	38	90	77	8500
70	25	7½	10	24	28	4000	300	40	90	85	8750
71	30	8½	10	24	28	4500	300	42	96	90	9500
72	40	8½	12	30	32	6000	300	42	96	90	16500
73	50	10	12	30	32	8000	300	48	102	142	17500

Write for Descriptive Circulars and Prices.

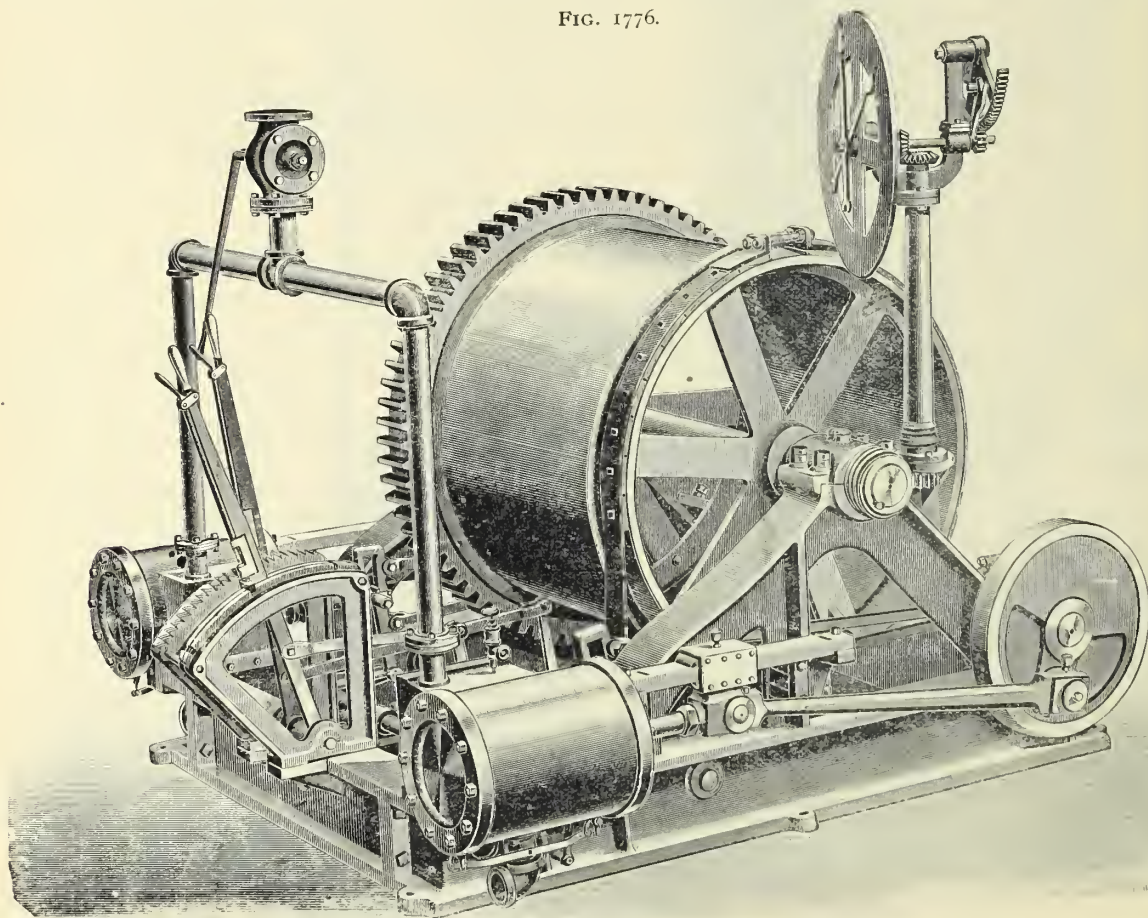
Prospecting Engine, Double or Single Cylinder.

Specially adapted for prospecting and opening small mines, and sinking shafts less than 600 feet deep, with boiler and fixtures complete and with foot brake.

PRENTISS TOOL & SUPPLY CO.

Size No. of Engine.	Horse Power, usually rated.	Diameter of Cylinders, Inches.	Stroke of Cylinders, Inches.	Diameter of Drum, Inches.	Length of Drum between Flanges	Size of Wire Rope Drum is Grooved for.	Number of Feet of Wire Rope Drum will hold Single Coil.	Average Weight Engine will hoist Single Line, Pounds.	Average Hoisting Speed per Minute.	Estimated Shipping Weight, Complete, Pounds.	Price of Engines and Fixtures, Complete.
74	14	6½	8	24	24	5/8	250	1800	350	3800	
75	18	6½	10	28	24	5/8	300	2000	350	5000	
76	20	7	10	30	24	5/8	300	2200	375	5500	
77	25	7½	10	36	30	¾	360	3000	375	7000	
78	30	8½	10	36	30	¾	360	3500	450	8000	
79	40	8½	12	40	36	¾	475	4000	450	11000	
80	50	10	12	48	40	1	490	4500	475	12000	
81	60	10½	14	54	40	1	550	5000	475	13500	
82	80	12½	16	60	48	1	700	7000	500	22000	
83	120	14½	18	66	60	1	1000	8000	500	24500	

FIG. 1776.



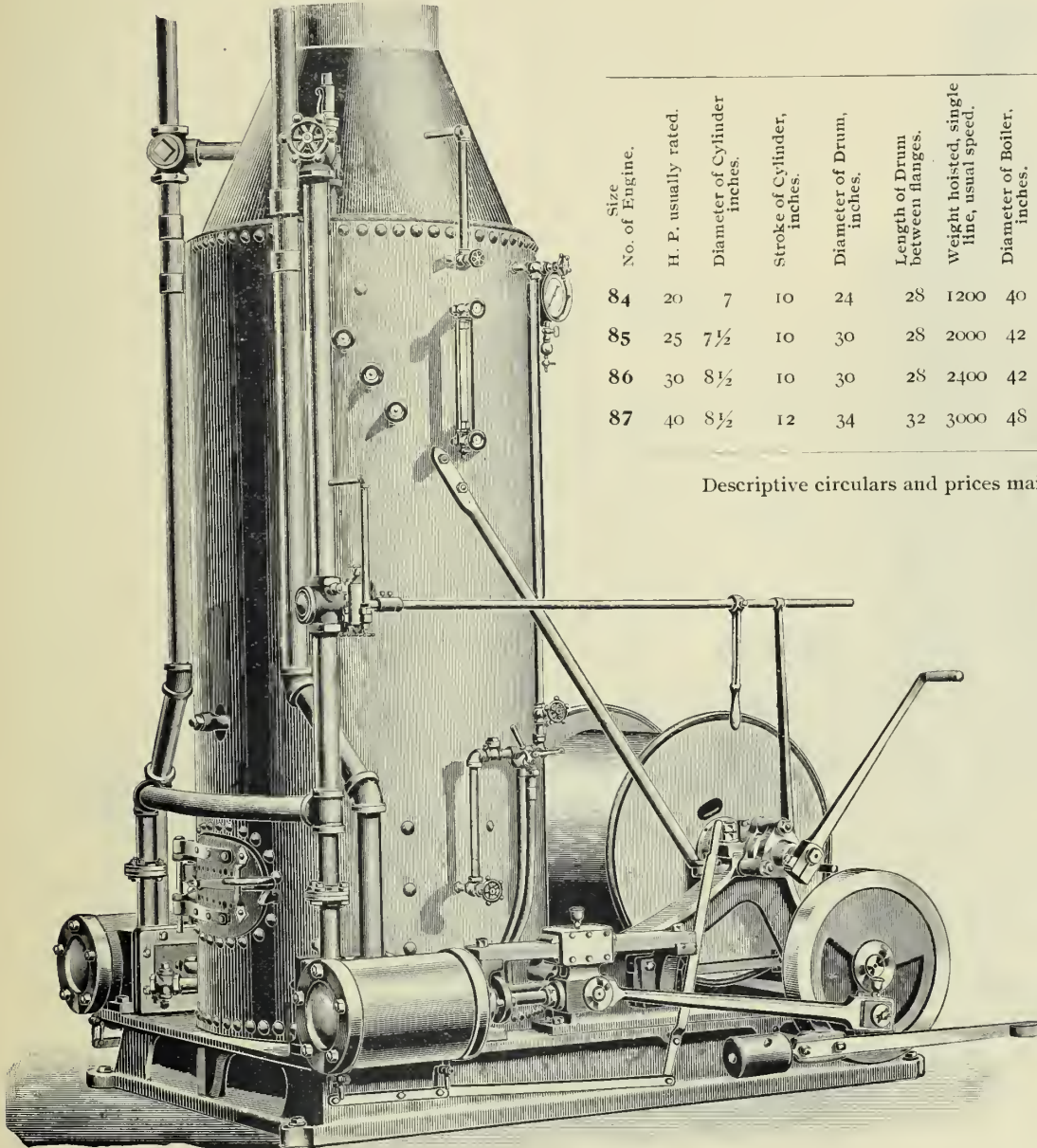
Double Cylinder, Reversible Link Motion Hoisting Engine, with Brake,

Adapted for high-speed hoisting, inclines and mines.

Write for descriptive circulars and prices.

PRENTISS TOOL & SUPPLY CO.

FIG. 1777.



Size No. of Engine.	H. P. usually rated.	Diameter of Cylinder inches.	Stroke of Cylinder, inches.	Diameter of Drum, inches.	Length of Drum between flanges.	Weight hoisted, single line, usual speed.	Diameter of Boiler, inches.	Height of Boiler, inches.	Number of 2-inch Boiler Tubes	Estimated Shipping Weight, with Boiler complete.	Price of Engine and Boiler, Ratchets and Pivots, and Fixtures complete.	Price of Engine and Boilers complete, including Foot Brakes
84	20	7	10	24	28	1200	40	90	85	\$8500		
85	25	7½	10	30	28	2000	42	96	90	9000		
86	30	8½	10	30	28	2400	42	96	90	9500		
87	40	8½	12	34	32	3000	48	102	142	10500		

Descriptive circulars and prices mailed upon application.

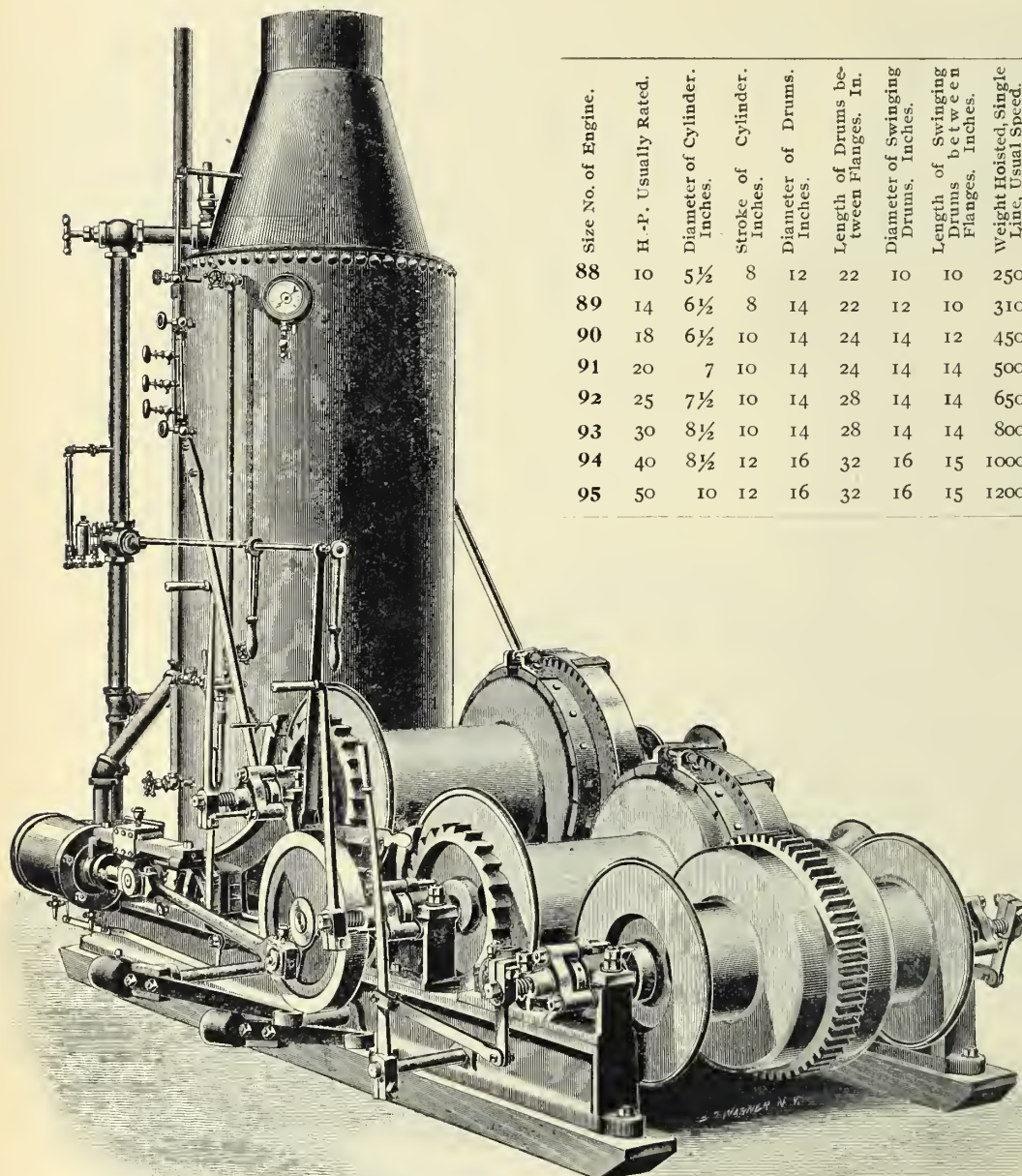
Double Cylinder, High Speed, Coal Hoisting Engine, with Patent Friction Drum and Foot Brake.

Proportion of gearing three to one or five to one as desired.

Average Hoisting Speed, 500 to 700 feet per minute.

PRENTISS TOOL & SUPPLY CO.

FIG. 1778.



Size No. of Engine.	H. -P. Usually Rated.	Diameter of Cylinder. Inches.	Stroke of Cylinder. Inches.	Diameter of Drums. Inches.	Length of Drums between Flanges. In.	Diameter of Swinging Drums. Inches.	Length of Swinging Drums between Flanges. Inches.	Weight Hoisted, Single Line, Usual Speed.	Suitable Weight for Pile Driving Hammer for Quick Work.	Diameter of Boiler. Inches.	Height of Boiler. In.	Number of 2-inch Boiler Tubes.	Estimated Shipping Weight with Boiler Complete.
88	10	5½	8	12	22	10	10	2500	1800	34	84	60	8000
89	14	6½	8	14	22	12	10	3100	2000	34	84	60	8500
90	18	6½	10	14	24	14	12	4500	2800	36	84	65	10500
91	20	7	10	14	24	14	14	5000	2800	38	90	77	11500
92	25	7½	10	14	28	14	14	6500	4000	42	96	90	13500
93	30	8½	10	14	28	14	14	8000	5000	42	96	90	14500
94	40	8½	12	16	32	16	15	10000	8000	48	102	142	22000
95	50	10	12	16	32	16	15	12000	10000	50	102	155	28000

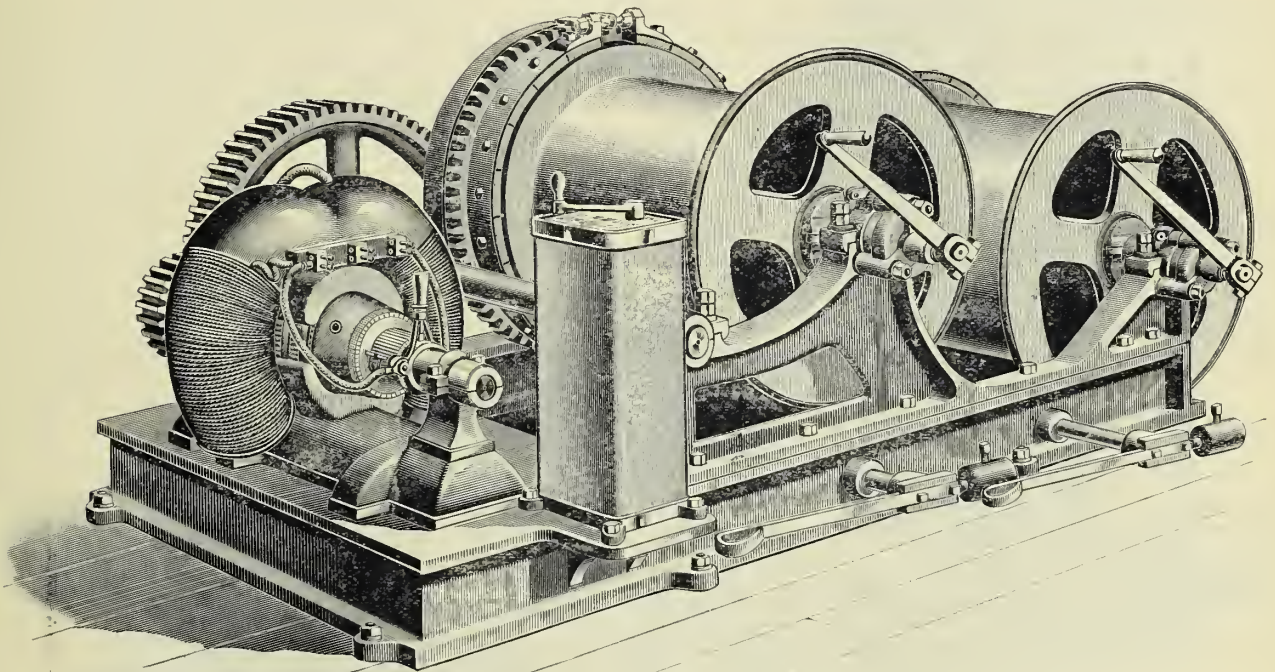
Standard Double Cylinder Double Patent Friction Drum Hoisting Engine.

WITH BOILER AND FIXTURES COMPLETE, WITH TWO EXTRA FRICTION DRUMS.

For swinging boom derrick, for contractors, quarries, etc., where it is required to swing derrick by steam power.



FIG. 1779.



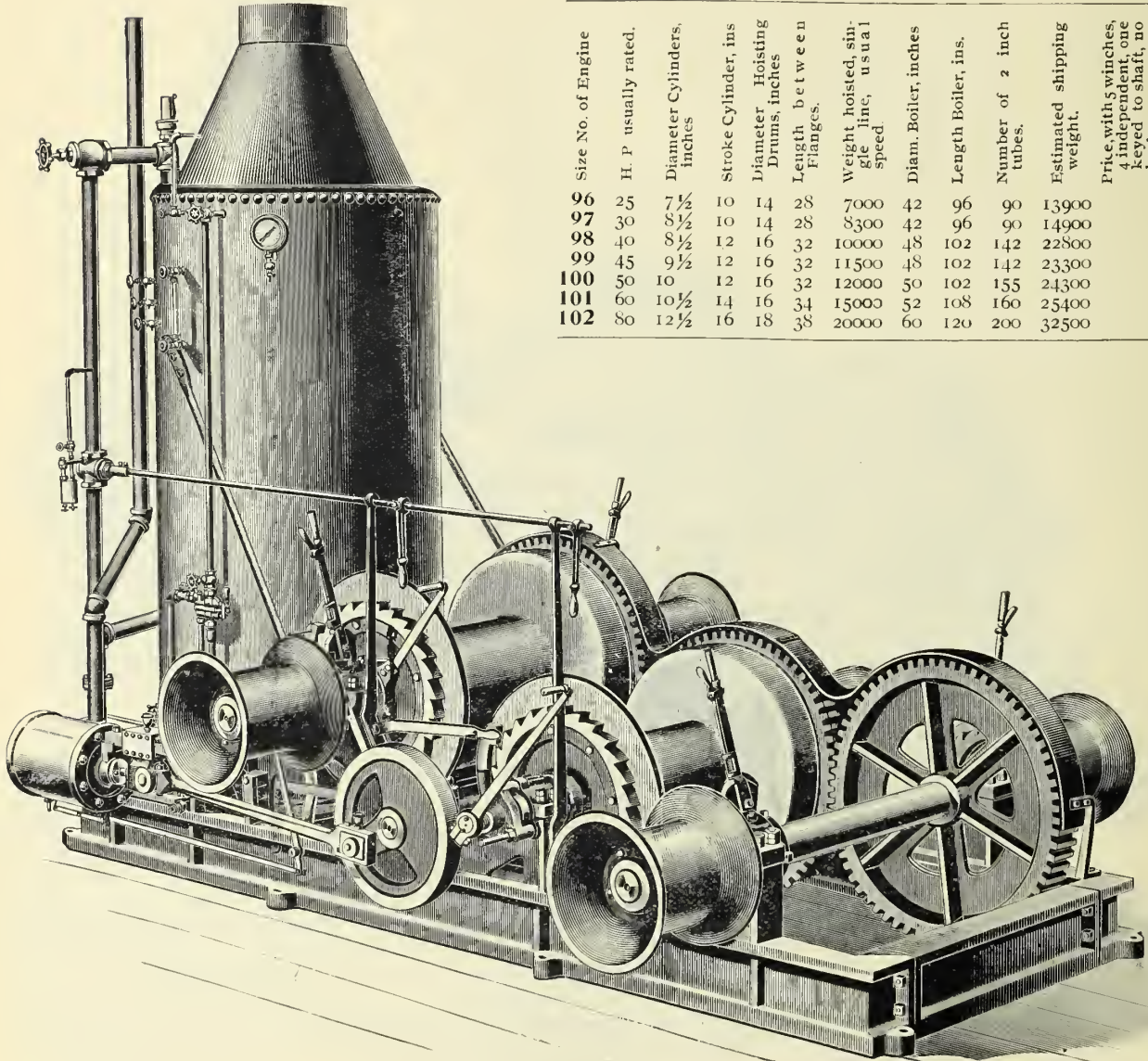
Double Patent Friction Drum Electric Hoist. With Foot Brakes and Controller.

FOR COAL HOISTING, MINING, ETC.

Prices on application.

PRENTISS TOOL & SUPPLY CO.

FIG. 1780.



Size No. of Engine	H. P. usually rated.	Diameter Cylinders, inches	Stroke Cylinder, ins	Diameter Hoisting Drums, inches	Length between Flanges.	Weight hoisted, single line, usual speed.	Diam. Boiler, inches	Length Boiler, ins.	Number of 2 inch tubes.	Estimated shipping weight.	Price, with 5 winches, 4 independent, one keyed to shaft, no brakes.	Price, with 5 independent winches, no brakes. Brakes extra.
96	25	7½	10	14	28	7000	42	96	90	13900		
97	30	8½	10	14	28	8300	42	96	90	14900		
98	40	8½	12	16	32	10000	48	102	142	22800		
99	45	9½	12	16	32	11500	48	102	142	23300		
100	50	10	12	16	32	12000	50	102	155	24300		
101	60	10½	14	16	34	15000	52	108	160	25400		
102	80	12½	16	18	38	20000	60	120	200	32500		

Double Cylinder Double Friction Drum Hoisting Engine.

With five Winch Heads, four independent with ratchet and pawls and one keyed to shaft, especially adapted to bridge building and general construction work.

Further information and prices on application.

CALENDERED IRON AND STEEL SHAFTHING.

CUT TO LENGTH (1 TO 24 FEET) WITHOUT EXTRA CHARGE.

Diameter in inches.	Weight per foot (for iron).	Width and depth of keyseat.	Price per lb.	Diameter in inches.	Weight per foot (for iron).	Width and depth of keyseat.	Price per lb.
$\frac{3}{8}$.093	. . .	13c.	1 7-16	5.41	$\frac{3}{8}$ x 3-16	5c.
$\frac{1}{4}$	.164	. . .		1 1/2	5.89	$\frac{3}{8}$ x 3-16
$\frac{5}{16}$	.256	. . .	11c.	1 9-16	6.40	$\frac{3}{8}$ x 3-16
$\frac{3}{8}$	.368	. . .	9c.	1 5/8	6.91	$\frac{3}{8}$ x 3-16
$\frac{7}{16}$	.501	. . .		1 11-16	7.45	$\frac{3}{8}$ x 3-16
$\frac{1}{2}$	.654	. . .		1 3/4	8.01	$\frac{3}{8}$ x 3-16
$\frac{9}{16}$	.83	. . .	7 1/2 c.	1 13-16	8.60	$\frac{3}{8}$ x 3-16
$\frac{5}{8}$	1.02	$\frac{1}{8}$ x $\frac{1}{16}$		1 7/8	9.20	$\frac{1}{2}$ x $\frac{1}{4}$	
$\frac{11}{16}$	1.23	$\frac{3}{8}$ x $\frac{1}{16}$		1 15-16	9.83	$\frac{1}{2}$ x $\frac{1}{4}$	
$\frac{3}{4}$	1.47	$\frac{3}{8}$ x $\frac{3}{8}$	6 1/2 c.	2	10.47	$\frac{1}{2}$ x $\frac{1}{4}$	
$\frac{7}{8}$	1.74	$\frac{1}{2}$ x $\frac{3}{8}$		2 1-16	11.15	$\frac{1}{2}$ x $\frac{1}{4}$	
$\frac{15}{16}$	2.00	$\frac{1}{4}$ x $\frac{1}{8}$		2 1/8	11.82	$\frac{1}{2}$ x $\frac{1}{4}$	
$\frac{1}{2}$	2.30	$\frac{1}{4}$ x $\frac{1}{8}$		2 3-16	12.54	$\frac{1}{2}$ x $\frac{1}{4}$	
$\frac{1}{2}$	2.30	$\frac{1}{4}$ x $\frac{1}{8}$		2 1/4	13.25	$\frac{1}{2}$ x $\frac{1}{4}$	
$\frac{1}{2}$	2.61	$\frac{1}{4}$ x $\frac{1}{8}$	5 1/2 c.	2 5-16	14.00	$\frac{1}{2}$ x $\frac{1}{4}$	
$\frac{1}{2}$	2.96	$\frac{1}{4}$ x $\frac{1}{8}$		2 3/8	14.76	$\frac{5}{8}$ x 5-16	
$\frac{1}{2}$	3.31	$\frac{1}{4}$ x $\frac{1}{8}$		2 7-16	15.57	$\frac{5}{8}$ x 5-16	
$\frac{1}{2}$	3.70	$\frac{1}{4}$ x $\frac{1}{8}$		2 1/2	16.37	$\frac{5}{8}$ x 5-16	
$\frac{1}{2}$	4.09	$\frac{1}{4}$ x $\frac{1}{8}$		2 9-16	17.20	$\frac{5}{8}$ x 5-16	
$\frac{1}{2}$	4.50	$\frac{1}{4}$ x $\frac{1}{8}$		2 5/8	18.03	$\frac{5}{8}$ x 5-16	
$\frac{1}{2}$	4.95	$\frac{3}{8}$ x $\frac{3}{8}$		2 11-16	1.891	$\frac{5}{8}$ x 5-16	
$\frac{1}{2}$	4.95	$\frac{3}{8}$ x $\frac{3}{8}$		2 3/4	19.80	$\frac{5}{8}$ x 5-16	
				2 13-16	20.71	$\frac{5}{8}$ x 5-16	
				2 7/8	21.63	$\frac{3}{4}$ x $\frac{3}{8}$	
				2 15-16	22.60	$\frac{3}{4}$ x $\frac{3}{8}$	
				3	23.56	$\frac{3}{4}$ x $\frac{3}{8}$	

TURNED SHAFTHING.

Diameter in inches.	Weight per foot (for iron).	Width and depth of keyseat.	Price per lb.	Diameter in inches.	Weight per foot (for iron).	Width and depth of keyseat.	Price per lb.
$\frac{3}{8}$	25.60	$\frac{3}{4}$ x $\frac{3}{8}$	5 1/2 c.	$\frac{3}{8}$	39.31	1 x $\frac{1}{2}$	6c.
$\frac{1}{2}$	26.60	$\frac{3}{4}$ x $\frac{3}{8}$		3 15-16	40.59	1 x $\frac{1}{2}$	
$\frac{3}{4}$	27.65	$\frac{3}{4}$ x $\frac{3}{8}$		4	41.88	1 x $\frac{1}{2}$	
$\frac{7}{8}$	29.82	$\frac{7}{8}$ x $\frac{7}{16}$		4 3-16	45.91	1 x $\frac{1}{2}$	
$\frac{15}{16}$	30.95	$\frac{7}{8}$ x $\frac{7}{16}$		4 1/2	47.29	1 x $\frac{1}{2}$	
$\frac{1}{2}$	32.07	$\frac{7}{8}$ x $\frac{7}{16}$	6c.	4 7-16	51.55	1 x $\frac{1}{2}$	6 1/2 c.
$\frac{3}{8}$	34.40	$\frac{7}{8}$ x $\frac{7}{16}$		4 1/2	53.01	1 x $\frac{1}{2}$	
$\frac{1}{2}$	35.60	$\frac{7}{8}$ x $\frac{7}{16}$		4 15-16	63.82	1 x $\frac{1}{2}$	
$\frac{3}{4}$	36.81	$\frac{7}{8}$ x $\frac{7}{16}$		5	65.45	1 x $\frac{1}{2}$	

Pump and piston rods extra.

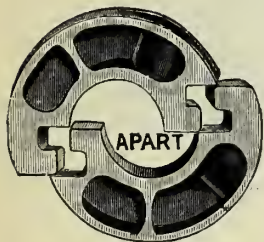
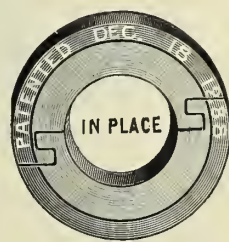


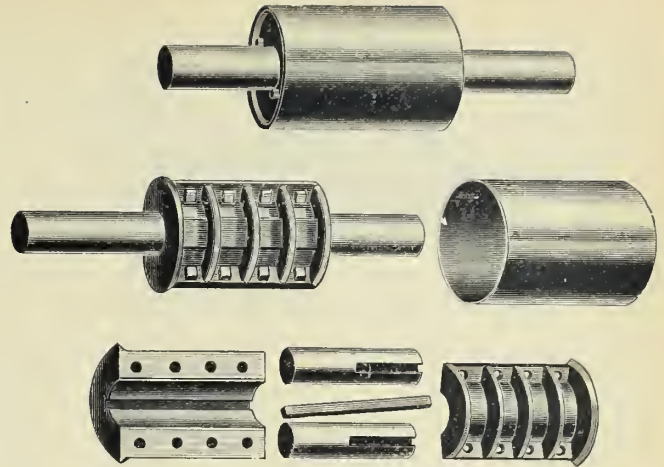
FIG. 1782.



PATENT SAFETY SET COLLARS (SPLIT).

The set screw is protected and cannot catch belts, clothes, etc. Furnished only when specially ordered.

FIG. 1781.



COMPRESSION COUPLINGS.

KEY-SEATED AND FURNISHED WITH KEYS.

These Couplings can be applied to shafts or removed therefrom very quickly and easily, and are shipped by us finished and fitted ready for use.

Couplings should always be located as near bearings as possible. They should never be more than 24 inches therefrom.

When correctly put up in a workmanlike manner, we guarantee full and entire satisfaction in every particular.

At the present time the above form of compression coupling is the only one we manufacture, although we have tested many other forms and at different times adopted several of them temporarily. A long and satisfactory experience with the clamp form of compression coupling leads us to believe that it is not only the simplest, but the most powerful, durable and reliable compression coupling in the market.

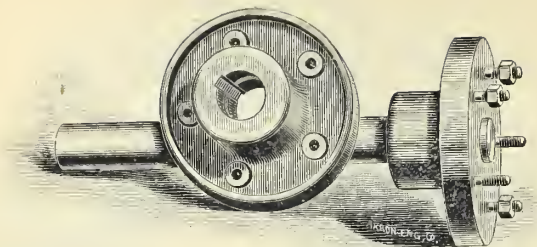
COMPRESSION COUPLINGS AND SLIP COLLARS.

Size inches.	Comp'n Coupling.	Solid Set Collar.	Patent Safety Split Collars.
15-16	\$ 5.20	\$.50	\$.75
1 3-16	5.40	.60	.90
1 5-16	5.60	.70	1.05
1 7-16	5.75	1.00	1.50
1 11-16	6.30	1.20	1.80
1 15-16	7.00	1.50	2.25
2 3-16	7.50	1.85	2.75
2 7-16	8.25	2.20	3.25
2 11-16	10.00	2.50	3.75
2 15-16	11.50	2.85	4.25
3 3-16	13.75	3.15	4.65
3 7-16	16.00	3.50	5.25
3 11-16	19.00	3.85	5.75
3 15-16	22.00	4.15	6.25
4 3-16	25.00	4.50	6.75
4 7-16	30.00	4.80	7.25
4 11-16	36.00	5.10	7.75
4 15-16	42.00	5.45	8.15
5 3-16		5.75	8.65
5 7-16		6.00	9.00
5 11-16		6.75	10.10
5 15-16		7.50	11.25

Couplings fitted for shafts and furnished with keys and bolts.

Reduction compression couplings, for connecting shafts of different diameters, same price as plain compression couplings for shafting of the larger size.

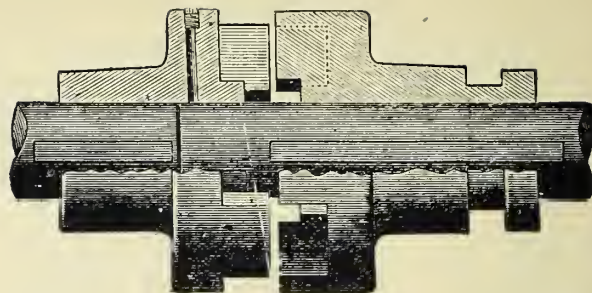
FIG. 1783.

**FLANGED-FACED OR PLATE COUPLING.**

KEYSEATED AND FURNISHED WITH KEYS AND BOLTS.

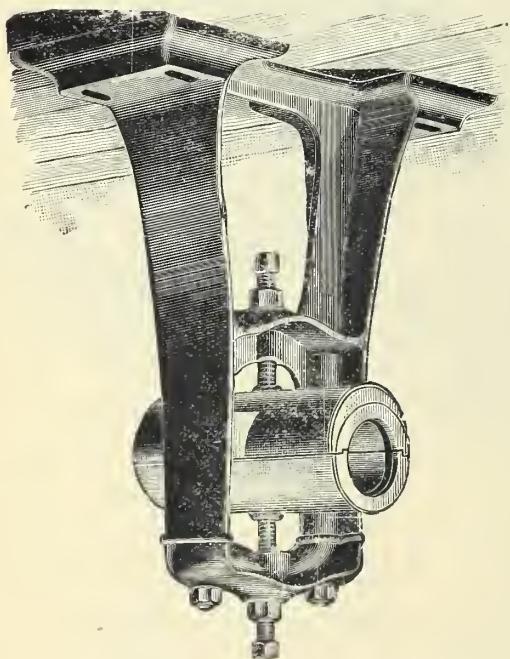
Diameter of Shaft,		Fitted, per pair, \$	
"	1 5-16	6.50	
"	1 3-16	6.75	
"	1 5-16	7.00	
"	1 7-16	7.25	
"	1 11-16	7.50	
"	1 15-16	9.00	
"	2 3-16	10.50	
"	2 7-16	12.50	
"	2 11-16	15.50	
"	2 15-16	18.50	
"	3 3-16	21.75	
"	3 7-18	25.00	
"	3 11-16	28.75	
"	3 15-16	32.50	
"	4 3-16	37.25	
"	4 7-16	42.00	
"	4 11-16	47.75	
"	4 15-16	53.50	
"	5 7-16	63.50	
"	5 15-16	77.00	

FIG. 1785.

**JAW CLUTCH COUPLING.**

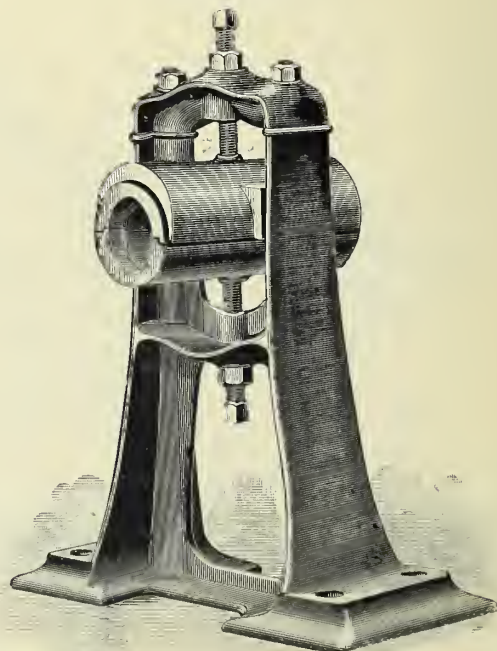
Diameter of Shaft,		Fitted, per pair, \$	
"	1 5-16	9.50	
"	1 3-16	10.00	
"	1 5-16	11.00	
"	1 7-16	12.00	
"	1 11-16	12.75	
"	1 15-16	13.50	
"	2 3-16	15.75	
"	2 7-16	18.75	
"	2 11-16	23.25	
"	2 15-16	27.75	
"	3 3-16	32.50	
"	3 7-16	37.50	
"	3 11-16	43.00	
"	3 15-16	48.75	

FIG. 1784.

**ADJUSTABLE DOUBLE BRACED SELF-OILING HANGER.**VARIABLE DROP, WITH BABBITTED BOXES. ($1\frac{1}{2}$ to 2 in. range.)

Construction such as to permit of quick adjustment to any drops that may be desired within the range specified.

FIG. 1786.

**ADJUSTABLE DOUBLE BRACED SELF-OILING FLOOR STAND.**

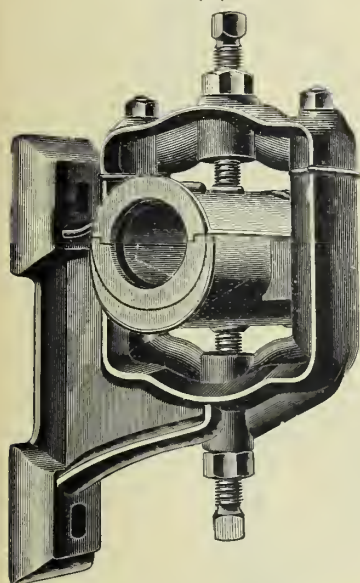
VARIABLE DROP, WITH BABBITTED BOXES.

Double Braced Self-Oiling Drop Hangers are readily convertible into Floor Stands by simply inverting the boxes, as shown in this cut. Prices same as for Adjustable Self-Oiling Hangers.

DOUBLE BRACED DROP HANGERS AND FLOOR STANDS.

Diameter of Shaft.	Range of Drop (in Inches)	6	8½	10½	12½	14½	16½	18½	20½	Quotations on extra heavy hangers and on extra long drops furnished on application.
		to 8	to 10	to 12	to 14	to 16	to 18	to 20	to 22	
Dia. of Shaft.	1 15-16	\$2.45	2.80	3.30	3.75	4.10				
	1 3-16	2.95	3.30	3.60	4.00	4.30				
	1 5-16	3.20	3.55	3.90	4.30	4.55	4.70	4.85	5.00	
	1 7-16	3.45	3.80	4.10	4.50	4.80	4.90	5.15	5.30	
	1 11-16	4.00	4.30	4.60	5.00	5.30	5.40	5.60	5.75	
Diameter of Shaft.	2 7-16	8.10	8.60	9.25	10.00	10.75	11.60	12.40	13.75	14.50
	2 11-16	10.10	10.60	11.80	12.30	13.00	14.10	15.50	17.50	18.50
	2 15-16	12.00	12.90	13.90	14.80	15.50	16.75	18.00	20.25	21.25
	3 3-16		15.25	16.30	17.25	18.00	19.50	20.75	23.00	24.25
	3 7-16		19.50	21.00	22.25	23.25	25.00	26.50	29.00	30.50
	3 11-16		22.00	23.25	24.25	25.50	27.25	29.00	31.00	32.25
	3 15-16		24.00	25.50	26.75	27.75	29.50	31.50	33.00	35.50
	4 3-16		28.00	29.00	30.00	31.00	33.00	34.00	37.00	40.50
	4 7-16		32.50	33.00	33.75	35.00	36.50	38.50	41.00	45.50
	4 15-16		36.00	37.50	39.25	41.50	44.50	46.00	48.00	50.00
										31
										34
										to 33
										to 36
										11.00
										12.50
										13.75
										15.25
										19.50
										22.25
										25.25
										32.00
										34.25
										37.50
										42.50
										47.50
										52.00

FIG. 1787.



ADJUSTABLE SELF-OILING POST HANGERS.

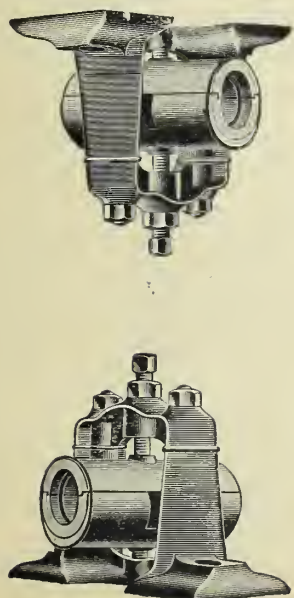
WITH BABBITTED BOXES.

BASE MEASUREMENT.										
Diameter of Shaft.	No. of Hanger	Length of Bearing.	Centre of Shaft to Bottom of Base.	Length Over All.	Width.	Center to Center of Bolts.	Thickness	No. of Bolts.	Diam. of Bolts.	Price.
inches.		inches	A	B	C	D	E			
1 3-16	1	5	4	9¼	3	6⅞	⅝	2	½	\$ 3.00
1 7-16	2	6	4⅝	10¾	3¾	7¾	¾	2	½	3.50
1 11-16	2	7	4⅝	10¾	3¾	7¾	¾	2	½	4.25
1 15-16	3	7	5½	12⅞	4½	9	1	2	⅝	5.25
2 3-16	3	9	5½	12⅞	4½	9	1	2	⅝	6.50
2 7-16	4	10	6¾	15	5	11¼	1⅞	2	¾	8.00
2 11-16	4	11	6¾	15	5	11¼	1⅞	2	¾	9.75
2 15-16	5	12	8	18	6	13¾	1¼	2	¾	11.75
3 3-16	5	13	8	18	6	13¾	1¼	2	¾	14.00
3 7-16	6	14	9½	21⅞	7	16¼	1⅝	2	⅞	17.00
3 11-16	6	14	9½	21⅞	7	16¼	1⅝	2	⅞	20.50
3 15-16	7	16	10¾	25	8	18½	1½	2	1	24.00
4 3-16	7	16	10¾	25	8	18½	1½	2	1	28.50
4 7-16	8	16	13	29¼	8¼	23	1½	2	1⅛	33.00

ADJUSTABLE SELF-OILING PILLOW BLOCKS AND "SHORT DROP" HANGERS.

WITH BABBITTED BOXES. (INTERCHANGEABLE.) DROP VARIABLE.

FIG. 1788.



Diameter of Shaft.	Number of Hanger.	Length of Bearing.	Center of Shaft to Bottom of Base.	BASE MEASUREMENT.					Holding-Down Bolts	Price.	
				Length Over All.	Width.	Center to Center of Bolts.		Thick-ness.			
						A	B		C		D	E	F	Diameter.	No.,
Inches.		Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.		
15-16	1	4	3½	10¾	4	7		1	½	2	\$2 40
1 3-16	1	5	3½	10¾	4	7		1	½	2	2 85
1 5-16	1	5	3½	10¾	4	7		1	½	2	3 30
1 7-16	2	6	4¼	12⅞	4⅝	8½		1⅛	½	2	3 80
1 11-16	2	7	4¼	12⅞	4⅝	8½		1⅛	½	2	4 25
1 15-16	3	8	4¾	14	4⅞	9½		1¼	⅝	2	5 00
2 3-16	3	9	4¾	14	4⅞	9½		1¼	⅝	2	6 50
2 7-16	4	10	5¾	17	6⅞	11½		1⅝	⅞	2	8 00
2 11-16	4	11	5¾	17	6⅞	11½		1⅝	⅞	2	9 75
2 15-16	5	12	6½	19	6½	13		1½	⅞	2	11 50
3 3-16	5	12	6½	19	6½	13		1½	⅞	2	14 50
3 7-16	6	14	7	21¾	8¼	14½	2⅞	1¾	⅞	4	17 00
3 11-16	6	14	7	21¾	8¼	14½	2⅞	1¾	⅞	4	20 50
3 15-16	7	16	7½	23¼	8½	16	2⅞	1¾	1	4	24 50
4 3-16	7	16	7½	23¼	8½	16	2⅞	1¾	1	4	29 00
4 7-16	8	16	7¾	24½	9⅞	17¼	3½	1¾	1	4	33 50
4 15-16	9	18	8¼	26	10	19	3⅞	1⅞	1	4	43 00
5 7-16	10	20	8⅞	27½	10⅞	19¾	4	1⅞	1	4	52 00
5 15-16	10	20	8⅞	27½	10⅞	19¾	4	1⅞	1	4	65 00

RIGID JOURNAL BOXES.

WITH BABBITTED BEARINGS.

Diameter of Shaft.	Length of Bearing.	BASE.		Center of Shaft to Bottom of Base. C	Height Over All. D	Center to Center of Bolts. E	Holding-Down Bolts.		Price.
		Length. A	Width. F				Size.	No.	
Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.		
1 5-16	3 1/4	7	1 7/8	1 1/8	2 1/4	5 1/8	1/2	2	\$1 30
1 3-16	5	7 5/8	2 3/8	1 3/8	2 7/8	5 5/8	1/2	2	1 60
1 7-16	5	7 7/8	2 5/8	1 9-16	2 7/8	5 7/8	1/2	2	2 00
1 11-16	5 3/4	9	3	1 9-16	3 1/4	7	5/8	2	2 65
1 15-16	6 1/2	9 1/4	3 1/2	1 3/4	4	7 1/8	5/8	2	3 35
2 3-16	7 1/4	9 1/2	4	1 7/8	4 1/4	7 1/4	3/4	2	4 00
2 7-16	8	11 1/8	4 1/4	2	4 3/8	8 1/2	3/4	2	4 80
2 11-16	9	11 1/2	4 3/4	2 1/4	4 3/4	9	3/4	2	5 65
2 15-16	9 3/4	13	5 1/8	2 1/2	5 1/4	10	7/8	2	6 70
3 3-16	10 3/4	13 1/4	5 1/2	2 3/4	5 3/8	10 3/8	7/8	2	7 75
3 7-16	11 1/2	14	6 1/8	2 3/4	6	10 3/4	7/8	2	8 90
3 11-16	12	15 1/4	6 1/2	3 1/8	6 1/4	11 3/4	1	2	10 10
3 15-16	13	16	7	3 1/4	6 3/4	12 1/2	1	2	11 50
4 3-16	13	18	8	3 3/8	7 1/2	14	1	2	13 50
4 7-16	13	18	8	3 3/8	7 1/2	14	1	2	15 00
4 15-16	16	18 1/2	9	4 1/2	9	15	1	2	19 00
5 7-16									23 50
5 15-16									28 50
6 7-16									34 00
6 15-16									40 00

FIG. 1789.

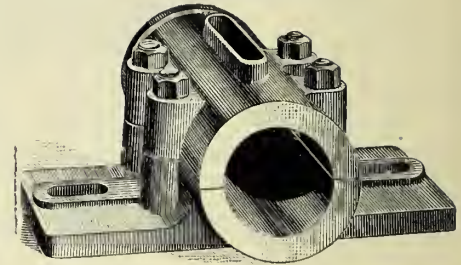
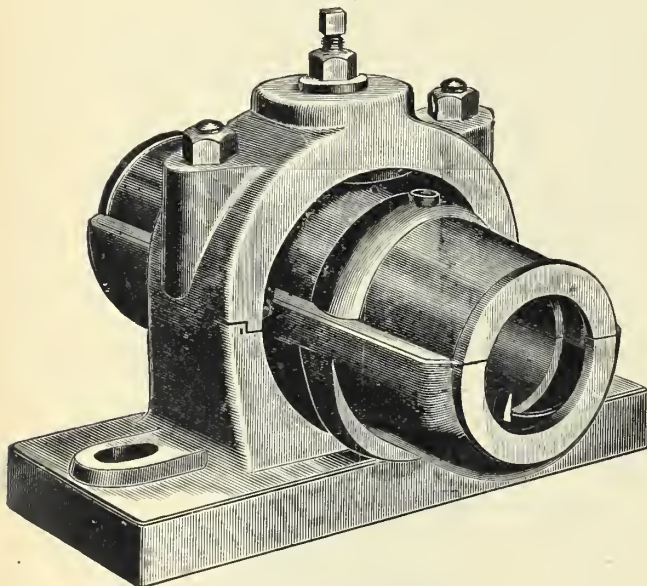


FIG. 1790.



SPECIAL BALL AND SOCKET PILLOW BLOCK.

FOR ELECTRICAL OR OTHER HEAVY HIGH SPEED SERVICE.

Not carried in stock.

These Pillow Blocks are extra heavy, self-oiling, Babbitted with strictly number one metal, finely finished and guaranteed to satisfactorily meet the requirements of the hardest and most exacting service.

They are made for 3 15-16 and larger sizes of shafting, and are largely used in electric-light plants in connection with the adjustable floor stands illustrated.

LENGTH OF BEARINGS.

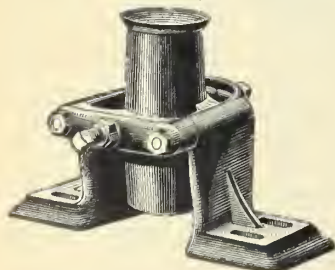
3 15-16	-	-	20 inches	5 15-16	-	-	27 1/8 inches
4 7-16	-	-	22 inches	6 7-16	-	-	29 inches
4 15-16	-	-	24 inches	6 15-16	-	-	31 1/4 inches
5 7-16	-	-	25 1/4 inches				

Prices quoted upon application.

UPRIGHT SHAFT FLOOR BEARING.

SELF OILING.

FIG. 1791.

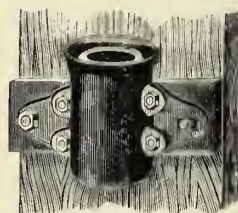


Diam. of Shaft.	A	B	C	D	Price.
in.	in.	in.	in.	in.	
1 7-16	6 3/4	4 1/2	5 1/2	1/2	\$4.75
1 11-16	7 1/2	5	6	1/2	5.25
1 15-16	8 1/4	5 3/8	6 1/2	1/2	6.00
2 3-16	8 7/8	6	6 3/4	1/2	7.00
2 7-16	9 1/4	6 3/4	7 1/8	5/8	8.00
2 11-16	9 1/4	6 3/4	7 1/8	5/8	9.75
2 15-16	11	7 3/4	8 1/2	3/4	12.00
3 3-16	11	7 3/4	8 1/2	3/4	14.50
3 7-16	12	8 3/4	9 1/2	7/8	17.00
3 15-16	13	9 1/2	10 1/2	1	24.50

VERTICAL SHAFT BOX.

BABBITTED. NOT SELF-OILING.

FIG. 1792.



Diam. of Shaft,	1 3-16,	-	-	\$ 2.75
"	"	1 7-16,	-	3.25
"	"	1 11-16,	-	3.75
"	"	1 15-16,	-	5.00
"	"	2 3-16,	-	6.25
"	"	2 7-16,	-	7.50
"	"	2 11-16,	-	9.00
"	"	2 15-16,	-	11.25
"	"	3 3-16,	-	13.00
"	"	3 7-16,	-	16.00

FIG. 1193.

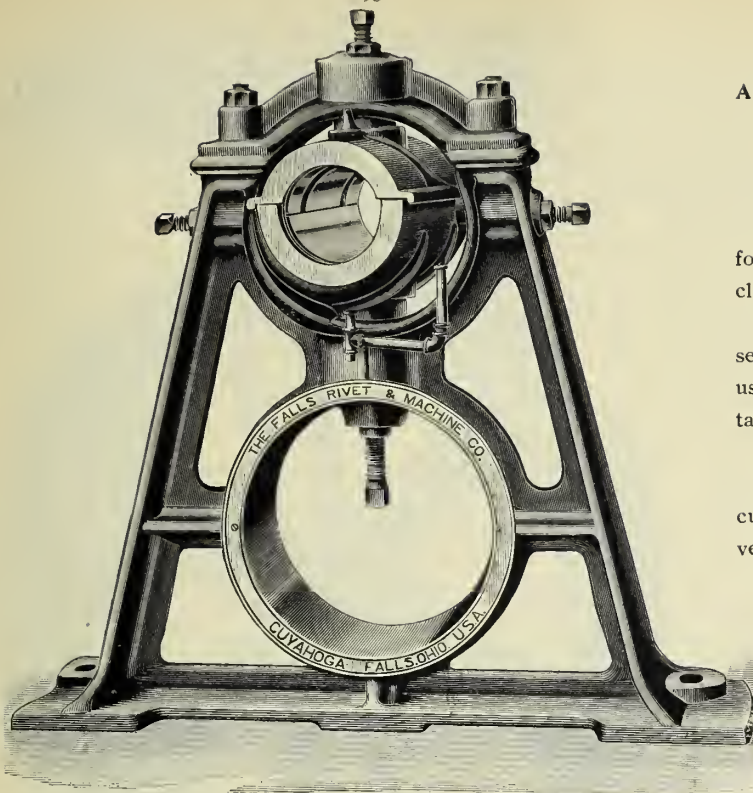
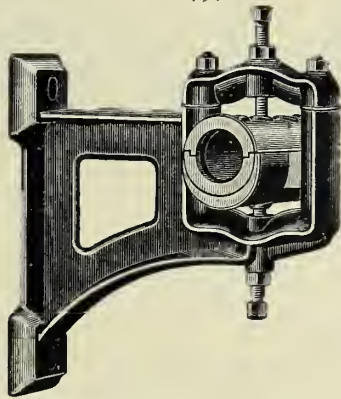


FIG. 1794.



ADJUSTABLE SELF-OILING BRACKET HANGER.

WITH BABBITTED BOXES. (INTERCHANGEABLE.)

Size of Shaft.	REACH. (Center of Shaft to Bottom of Base.)	PRICE.	DIMENSIONS.			No. of Bolts.	Diam. of Bolts.	No. of Hanger.
			A	B	C			
in.	in.		in.	in.	in.		in.	
1 7-16 to 1 11-16	10	\$4 50	14	3 3/4	10 3/4	2	5/8	2
	12	4 75	15 5/8	3 3/4	11 1/8	2	5/8	2
1 11-16 to 1 15-16	14	5 25	17 1/4	4	13 1/2	2	5/8	2
	16	5 80	18 7/8	4	15	2	5/8	2
1 15-16 to 2 3-16	10	6 75	15 5/8	4 1/2	11 1/8	2	3/4	3
	12	7 15	17 1/8	4 1/2	12 7/8	2	3/4	3
2 3-16 to 2 7-16	14	7 50	18 3/8	4 5/8	14 7/8	2	3/4	3
	16	7 80	19 3/4	4 5/8	15 3/8	2	3/4	3
2 7-16 to 2 11-16	10	9 80	18	5	16 3/8	2	7/8	4
	12	10 10	18 3/4	5	17	2	7/8	4
2 11-16 to 2 15-16	14	10 45	19 1/2	5 1/4	17 3/8	2	7/8	4
	16	10 75	20 3/8	5 3/8	18 3/8	2	7/8	4
2 15-16 to 3 3-16	10	14 50	20 3/8	6	18	2	7/8	5
	12	15 25	21 1/2	6	18 1/2	2	7/8	5
3 3-16 to 3 7-16	14	15 75	22 3/8	6 1/4	19 1/2	2	7/8	5
	16	16 00	23 3/4	6 3/8	19 3/4	2	7/8	5

ADJUSTABLE FLOOR STAND FOR PILLOW BLOCK OR JOURNAL BOX.

Not carried in stock.

Prices quoted upon application.

Floor bolts and bolts shown by dotted lines are extra, therefore are only furnished when specified in orders, and an additional charge is made for the same.

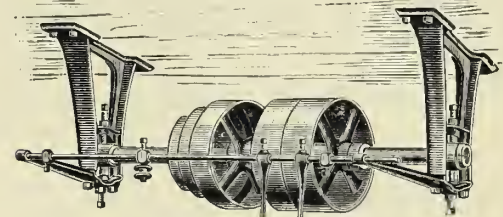
Designed for heavy shafting (3 1/2 and larger diameter) and service where our regular Floor stands, illustrated, cannot be used. They are very strong and rigid, and either rigid or adjustable pillow blocks may be used upon them.

Distance from floor to center of box, 30 to 48 inches.

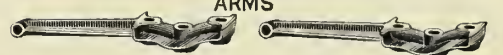
The eight adjusting bolts, of which but five are visible in the cut above shown, permit of a close adjustment both laterally and vertically, and enable the shafting to be very accurately aligned.

Especially suitable for use in electric light plants.

FIG. 1795.



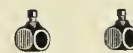
COUNTERSHAFT ARMS



ROD



FINGERS



COLLARS



CLAMP

SHIFTING ATTACHMENTS.

SHIFTING FIXTURES FOR COUNTERSHAFT HANGERS.

These attachments can be added to any size of hanger that may be desired.

The following items comprise a complete shifting attachment, by means of which any one of our large stock of Drop Hangers can readily be fitted up as a countershaft hanger with a very simple and desirable belt shifting rig attached: 2 hanger arms; 2 belt fingers; 2 check collars; 1 lever clamp; 1 shifting rod.

Hanger No.	Size.	Price Complete Attachment.	Fixtures Without Arms	Price per Arm.
1	15 16 to 1 5 16	\$2.25 net.	\$1.25 net.	\$0.50 net.
2	1 3/8 to 1 3/4	2.50 net.	1.25 net.	.65 net.
3	1 13-16 to 2 5-16	3.00 net.	1.25 net.	.90 net.
4	2 3/8 to 2 3/4	3.70 net.	1.25 net.	1.25 net.

SOLE OR BASE PLATE.

For Self-Oiling Pillow Block or Rigid Journal Box, with Bolts for securing box, but without "holding down" or foundation bolts.

Designed for use when extra large or heavy bases are required. Any style of pedestal or box desired can be used upon them, and can be adjusted both laterally and vertically.

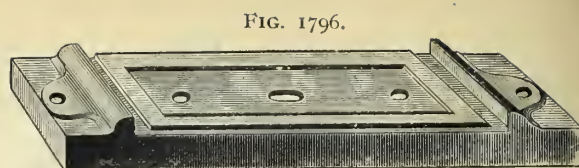


FIG. 1796.

DIAMETER OF SHAFT.

1 7-16	1 11-16	1 15-16	2 3-16	2 7-16	2 11-16	2 15-16	3 3-16	3 7-16	3 11-16	3 15-16	4 3-16	4 7-16	4 11-16	4 15-16	5 7-16	5 15-16
\$2.30	2.60	2.60	3.50	3.50	5.00	5.00	5.60	6.20	7.80	9.40	10.50	11.50	13.50	14.50	16.30	21.50

PATENT STEEL RIM PULLEYS.

EITHER SOLID OR SPLIT IN HALVES.

These pulleys are earnestly recommended to the special attention of all persons interested in the subject of power transmission.

We claim they are the best pulleys in the market, on the following grounds:

They are all made running balance.

They are from 25 to 40 per cent. lighter than corresponding sizes of ordinary cast iron pulleys, but are much stronger and capable of transmitting fully 15 per cent. more power.

The saving in weight is principally made in the rim, where, for several reasons, lightness is most desirable.

The rims being made of rolled steel cannot be chipped while in transit to destination, or broken by accidents in handling that would ruin an ordinary cast pulley.

The continuous cast iron inner rim (connecting the outer ends of the pulley arms) effectually preserves the pulley's perfect roundness, no matter how tight the belt or how high the speed at which it may be run.

The steel rims are so securely riveted to the supporting cast rims that they cannot possibly work loose.

MADE IN THE FOLLOWING DESIGNS:

Crowning faced pulley,	-	-	-	-	-
" " split pulley.	-	-	-	-	-
Flat faced pulley,	-	-	-	-	-
" " split pulley,	-	-	-	-	-
Crowning faced pulley, for double belt,	-	-	-	-	-
" " split pulley, for double belt,	-	-	-	-	-
Flat faced pulley, for double belt,	-	-	-	-	-
" " split pulley, for double belt,	-	-	-	-	-
Double arm pulley, crowning face,	-	-	-	-	-
" " flat face,	-	-	-	-	-
Pair of tight and loose pulleys,	-	-	-	-	-
Wood split pulley, crowning face,	-	-	-	-	-
" " flat face.	-	-	-	-	-

STATIONARY STEP FOR UPRIGHT SHAFT.

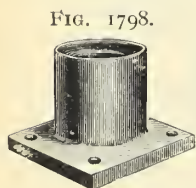


FIG. 1798.

Diam. of Shaft,	1 7-16,	with Iron Bush,	\$1.00
"	"	1 11-16,	" " " 4.50
"	"	1 15 16,	" " " 5.25
"	"	2 3 16,	" " " 5.75
"	"	2 7 16,	" " " 6.50
"	"	2 11 16,	" " " 7.00
"	"	2 15 16,	" " " 7.75
"	"	3 3-16,	" " " 8.50
"	"	3 7 16,	" " " 9.80
"	"	3 11 16,	" " " 12.30
"	"	3 15 16,	" " " 15.75

Fitted with Brass Bushings if desired. Prices upon application.

ADJUSTABLE STEP FOR UPRIGHT SHAFT.

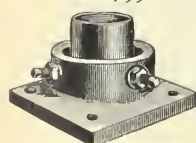


FIG. 1799.

Diam. of Shaft,	2 7-16,	with Iron Bush,	\$8.40
"	"	1 11 16,	" " " 11.20
"	"	2 15 16,	" " " 14.00
"	"	3 3-16,	" " " 18.25
"	"	3 7-16,	" " " 21.80
"	"	3 11-16,	" " " 24.00
"	"	3 15-16,	" " " 30.00

Fitted with Brass Bushings if desired. Prices upon application.

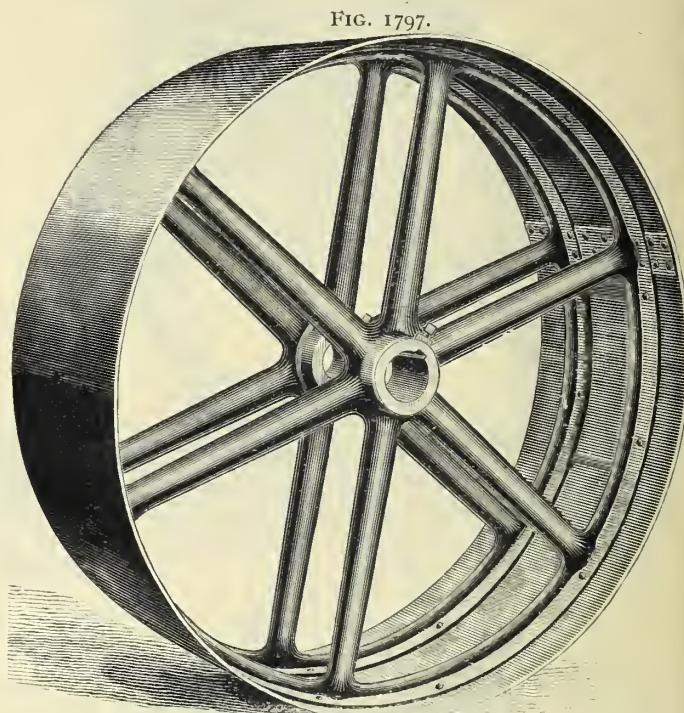


FIG. 1797.

Prices of steel rim pulleys upon application.

Minimum Sizes—We do not manufacture Steel Rim Pulleys in diameters smaller than 12 in. or with narrower than 6 in. faces, unless by special contract or arrangement. For 49 in. or larger Steel Rim Pulleys the narrowest face is 8 inches.

Pulleys with eyes or bores disproportionate to their diameters or with special hubs, are subject to extra charges.

Intermediate Faces.—Pulleys having faces $\frac{1}{2}$ inch or more wider than those specified in price list will be charged for at prices of next wider faces.

Pulleys finished with both keyways and set screws and single belt pulleys having keyways will be subject to extra charges.

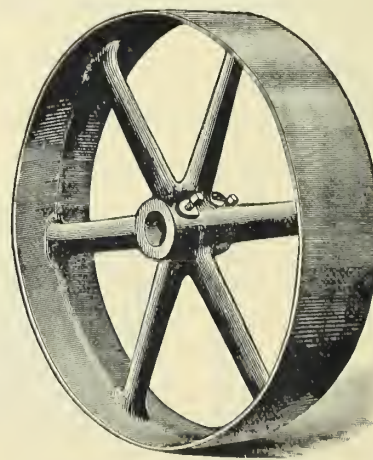
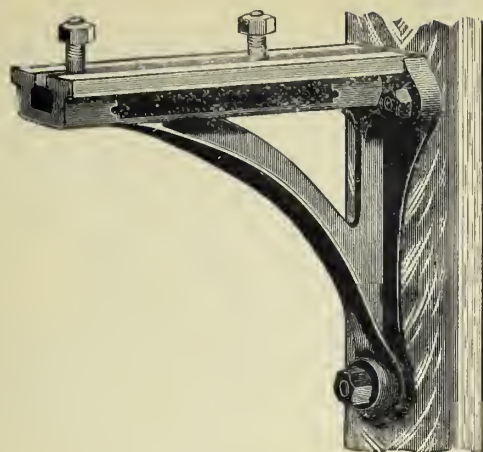


FIG. 1800.

CAST IRON PULLEY.

FIG. 1801.

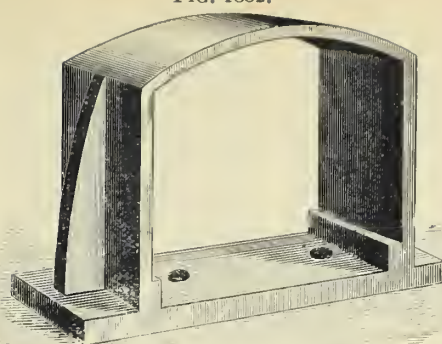


WALL BRACKET.

WITH BOLTS FOR SECURING PILLOW BLOCK OR JOURNAL BOX.

Diameter of Shaft.	Reach. (Drop.)	Price.	Diameter of Shaft	Reach. (Drop.)	Price
1 7-16	18 inches.	\$6 25	2 15-16	18 inches.	\$ 9 75
to	24 "	6 75	to	24 "	10 75
1 11-16	30 "	7 25	3 3-16	30 "	11 75
1 15-16	18 "	6 50	3 7-16	18 "	22 50
to	24 "	7 00	to	24 "	25 25
2 3-16	30 "	7 60	3 11-16	30 "	26 75
2 7-16	18 "	6 75	3 15-16	18 "	24 25
to	24 "	7 50	to	24 "	27 50
2 11-16	30 "	8 25	4 3-16	30 "	28 75

FIG. 1802.



WALL FRAME OR BOX.

FOR PILLOW BLOCKS OF ANY STYLE, OR RIGID JOURNAL BOXES.

Size of Shaft,	1 7-16 in.	-	-	Price,	\$4 25
"	1 11-16 in.	-	-	"	4 75
"	1 15-16 in.	-	-	"	5 25
"	2 3-16 in.	-	-	"	6 00
"	2 7-16 in.	-	-	"	7 00
"	2 11-16 in.	-	-	"	8 50
"	2 15-16 in.	-	-	"	10 25
"	3 3-16 in.	-	-	"	11 75
"	3 7-16 in.	-	-	"	13 60
"	3 11-16 in.	-	-	"	15 75
"	3 15-16 in.	-	-	"	19 35
"	4 3-16 in.	-	-	"	23 50
"	4 7-16 in.	-	-	"	28 25
"	4 11-16 in.	-	-	"	33 50
"	4 15-16 in.	-	-	"	37 20
"	5 7-16 in.	-	-	"	44 00
"	5 15-16 in.	-	-	"	50 80

MACHINE MOLDED CAST IRON PULLEYS.

FINISHED PULLEYS.

BORED, TURNED, BALANCED AND WITH SET SCREWS.

Diam. in inch.	Width of face.	Single Belt.	Diam. in inch.	Width of face.	Single Belt.	Diam. in inch.	Width of face.	Single Belt.
6	3	\$1 50	10	8	\$4 10	14	6	\$6 50
	4	1 75		9	4 50		7	4 90
	5	2 00		10	5 00		8	5 20
	6	2 25		12	5 60		9	5 70
	7	2 50		14	6 40		10	6 10
	8	2 75	11	3	2 90		12	7 10
7	3	1 70		4	3 10	15	14	8 30
	4	1 90		5	3 45		3	3 70
	5	2 10		6	3 80		4	4 00
	6	2 50		7	4 10		5	4 30
	7	2 95		8	4 40		6	4 70
	8	3 35		9	4 70		7	5 10
	9	3 75		10	5 25		8	5 50
	10	4 20		12	5 90		9	6 00
8	3	2 00		14	6 80		10	6 50
	4	2 20	12	3	3 00		12	7 50
	5	2 50		4	3 30		14	8 80
	6	2 90		5	3 60	16	3	3 90
	7	3 30		6	4 00		4	4 20
	8	3 70		7	4 30		5	4 50
	9	4 20		8	4 60		6	5 00
	10	4 70		9	4 90		7	5 50
	12	5 30		10	5 50		8	6 00
9	3	2 25		12	6 20		9	6 50
	4	2 50		14	7 30		10	7 00
	5	2 80	13	3	3 10		12	8 00
	6	3 10		4	3 40		14	9 40
	7	3 50		5	3 80		16	10 80
	8	3 90		6	4 20	17	3	4 10
	9	4 30		7	4 55		4	4 40
	10	4 70		8	5 00		5	4 70
	12	5 30		9	5 40		6	5 20
	14	6 10		10	5 80		7	5 70
10	3	2 80		12	6 60		8	6 20
	4	3 00		14	7 70		9	6 80
	5	3 25	14	3	3 50		10	7 40
	6	3 50		4	3 80		12	8 50
	7	3 80		5	4 20		14	10 00
							16	11 07

FINISHED PULLEYS.

BORED, TURNED, BALANCED, WITH KEYWAYS OR SET SCREWS.

Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.
18	3	\$4 30	\$5 60	21	4	\$5 30	\$7 00
	4	4 60	6 20		5	5 80	7 65
	5	4 95	6 75		6	6 40	8 20
	6	5 50	7 30		7	7 20	9 20
	7	6 05	8 05		8	7 90	10 00
	8	6 60	8 75		9	8 65	11 00
	9	6 85	9 55		10	9 40	11 80
	10	7 90	10 30		12	11 00	14 15
	12	9 10	11 85		14	13 10	16 55
	14		13 80		16		19 05
	16		15 85		18		22 45
	18		18 50		20		26 35
19	3	4 50	5 85	22	4	5 60	7 40
	4	4 80	6 60		5	6 10	7 90
	5	5 15	7 10		6	7 00	8 80
	6	5 80	7 60		7	7 75	9 60
	7	6 40	8 40		8	8 40	10 55
	8	7 00	9 15		9	9 20	11 40
	9	7 80	10 10		10	10 00	12 40
	10	8 30	10 70		12	11 80	15 15
	12	9 70	12 60		14	13 90	17 50
	14		14 70		16		20 35
	16		16 85		18		23 90
	18		19 85		20		28 00
20	3	4 70	6 15	23	4	5 80	8 00
	4	5 00	6 50		5	7 20	8 60
	5	5 55	7 35		6	7 40	9 50
	6	6 20	8 00		7	8 15	10 40
	7	6 85	8 80		8	8 90	11 30
	8	7 50	9 65		9	9 75	12 55
	9	8 20	10 50		10	10 60	13 35
	10	8 90	11 30		12	12 50	16 10
	12	10 30	13 30		14	14 80	18 75
	14	12 30	15 65		16		21 70
	16		17 90		18		25 45
	18		21 35		20		29 40
	20		25 00				

FINISHED PULLEYS.—Continued.

Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.	
24	4	\$6 20	\$8 30	30	8	\$13 20	\$16 55	36	14	\$28 00	\$34 00	46	6	\$24 20	\$30 80	54	6	\$32 60	\$41 60	
	5	7 00	9 15			16			38 80		8		28 20	35 40			8	37 50	47 10	
	6	7 80	9 95			18			44 00		10		31 60	39 40			10	41 50	51 70	
	7	8 45	10 80			20			50 50		12		35 60	44 40			12	46 30	57 20	
	8	9 40	11 80				15 90		20 00		14		40 30	49 90			14	52 40	64 20	
	9	10 35	13 00			8	18 90		23 40		16			56 00			16		71 80	
	10	11 30	14 00			10	22 00		26 65		18			62 70			18		80 00	
	12	13 30	16 90			12	25 40		31 10		20			70 70			20		89 90	
	14	15 70	19 65			14	29 20		35 50		47		6	25 20	32 10			22		105 70
	16		22 90			16			40 30				8	29 30	36 80			24		122 80
25	18		26 65		18		45 60			10	32 80	40 90	55	6	33 70	43 00				
	20		30 80		20		52 20			12	36 70	45 60			8	38 70	48 60			
	4	6 50	8 75	38	6	16 70	20 90		14	41 70	51 50			10	42 80	53 30				
	5	7 40	9 70			8	19 70	24 50		16		58 00			12	47 80	59 00			
	6	8 30	10 55			10	22 80	28 20		18		65 00			14	54 00	66 00			
	7	9 10	11 60			12	26 50	32 50		20		72 80			16		74 10			
	8	10 00	12 55			14	30 30	36 90		48	6	26 20		33 40		18		82 50		
	9	10 95	13 70			16		41 80			8	30 40		38 20		20		92 70		
	10	11 90	14 75			18		47 20			10	34 00		42 40		22		108 70		
	12	14 10	17 85			20		54 10			12	38 00		47 00		24		125 70		
14	16 70	20 75			39	6	17 70	22 20		14	43 20	53 20	56	6	34 80	44 40				
16		24 15			8	20 80	25 90		16		60 20			8	39 90	50 10				
18		27 95		10	23 80	29 50		18		67 30		10		44 00	54 80					
20		32 25		12	27 60	34 00		20		74 90		12		49 30	60 80					
4	6 90	9 30	40	14	31 50	38 60		22		91 00		14		55 50	67 80					
5	7 80	10 20			16		43 30		24		105 50			16		76 50				
6	8 70	11 10			18		48 90		49	6	27 20	34 70			18		84 80			
7	9 65	12 30			20		55 90		8	31 60	39 70			20		95 50				
8	10 60	13 35			6	18 60	23 40		10	35 20	43 90			22		111 60				
9	11 65	14 60			8	21 80	27 20		12	39 30	48 80			24		129 00				
10	12 70	15 70			10	24 80	30 80		14	44 70	55 00		6	36 00	45 90					
12	15 00	18 95			12	28 80	35 50		16		62 20		8	41 00	51 50					
14	17 70	21 90			14	32 70	40 00		18		69 50		10	45 30	56 40					
16		25 45			16		45 00		20		77 80		12	50 80	62 60					
26	18		29 30		18		50 70		22		93 50		14	57 00	69 50					
	20		33 85		20		58 00		24		108 40		16		78 90					
	4	7 20	9 75	41	6	19 40	24 50		50	6	28 20	36 00		18		87 30				
	5	8 25	10 85			8	22 80	28 50		8	32 70	41 10		20		97 90				
	6	9 30	11 85			10	25 80	32 10		10	36 40	45 40		22		114 30				
	7	10 30	13 00			12	29 90	37 00		12	40 50	50 40		24		132 20				
	8	11 30	14 15			14	33 90	41 75		14	46 20	56 80	58	6	37 20	47 40				
	9	12 40	15 45			16		46 40		16		64 00			8	42 30	53 10			
	10	13 50	16 65			18		52 40		18		71 80			10	46 70	58 10			
	12	16 00	20 05			20		59 70		20		80 50			12	52 30	64 40			
14	18 70	23 05			22		66 20		22		88 00			14	58 80	71 40				
16		26 65			24		73 50		24		95 00			16		81 50				
18		30 55		26		80 50		26		102 00		18			90 00					
20		35 35		28		88 00		28		109 00		20			100 50					
28	4	7 60	10 35	42	8	23 90	29 90		51	6	29 30	37 40			22		117 20			
5	8 30	11 50			10	26 90	33 50		8	33 90	42 60			24		135 50				
6	9 90	12 65			12	31 10	38 60		10	37 70	47 00		26		153 80					
7	10 90	13 80			14	35 00	43 20		12	42 00	52 00		28		172 10					
8	11 90	14 90			16		48 10		14	47 80	58 60	59	6	38 40	48 90					
9	13 70	16 20			18		54 30		16		66 00			8	43 50	54 60				
10	14 30	17 65			20		61 60		18		74 00			10	48 10	59 80				
12	16 90	21 10			22		69 00		20		82 80			12	53 80	66 20				
14	19 70	24 25			24		76 50		22		91 00			14	60 40	73 30				
16		27 90			26		84 00		24		99 00			16		83 70				
18		32 05		28		92 00		26		107 00			18		92 50					
20		36 90		30		100 00		28		115 00			20		103 00					
29	4	8 00	10 85	43	6	22 20	28 20		52	6	30 40		38 80		22		120 00			
5	9 25	12 15			8	26 10	32 70		8	35 10	44 10			24		138 40				
6	10 50	13 35			10	29 30	36 50		10	39 00	48 60		26		156 80					
7	11 50	14 50			12	33 40	41 50		12	43 30	53 60		28		175 20					
8	12 50	15 65			14	37 60	46 40		14	49 30	60 50	60	6	39 50	50 30					
9	13 80	17 05			16		52 00		16		67 90			8	44 80	56 20				
10	15 10	18 45			18		58 40		18		76 00			10	49 50	61 50				
12	17 80	22 15			20		66 25		20		85 50			12	55 30	67 90				
14	20 80	25 45			22		74 10		22		94 00			14	62 00	75 20				
16		29 15			24		82 00		24		102 00			16		85 90				
18		33 25		26		90 00		26		110 00			18		95 00					
20		38 45		28		98 00		28		118 00			20		105 70					
30	4	8 50	11 50	44	6	23 10	29 40		53	6	31 50		40 20		22		122 80			
5	9 80	12 85			8	27 20	34 10		8	36 30	45 60			24		141 50				
6	11 10	14 10			10	30 40	37 90		10	40 20	50 00		26		160 20					
7	12 20	15 40			12	34 40	42 80		12	44 80	55 40		28		178 90					
					14	39 00	48 20		14	50 80	62 30		30		207 10					
					16		54 00		16		69 80		6	40 70	51 80					
					18		60 60		18		78 00		8	46 00	57 70					
					20		68 60		20		87 50		10	50 80	63 10					
					22		76 60		22		96 00		12		71 80					
					24		84 60		24		104 00		14		82 50					

FINISHED PULLEYS.—Continued.

Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.	Diam. in inch.	Width of face.	Single Belt.	Double Belt.
61	12	\$56 80	\$69 70	63	22	\$131 30	\$131 30	66	6	\$47 10	\$59 70	68	16	\$103 60	\$103 60	70	26	\$195 50	\$195 50
	14	63 50	77 00		24	150 80	150 80		8	52 80	66 00		18	114 70	114 70		28	219 30	219 30
	16		87 90		26	172 10	172 10		10	57 80	71 60		20	126 20	126 20		30	244 00	244 00
	18		97 20		28	194 80	194 80		12	64 00	79 00		22	146 00	146 00	71	6	\$53 80	67 90
	20		108 00		30	217 90	217 90		14	72 00	87 00		24	166 40	166 40		8	59 40	74 10
	22		125 70	64	6	\$44 50	56 50		16		99 00		26	189 10	189 10		10	64 80	80 10
	24		144 60		8	50 00	62 60		18		109 80		28	212 30	212 30		12	72 60	88 50
	26		165 70		10	54 90	68 10		20		120 90		30	236 80	236 80		14	80 90	97 40
	28		187 60		12	61 40	75 20		22		140 00	69	6	\$51 00	64 50		16		110 70
	30		210 70		14	68 40	82 80		24		160 00		8	56 70	70 80		18		122 30
62	6	42 00	53 40		16		94 00		26		181 90		10	62 00	76 70		20		134 40
	8	47 30	59 30		18		104 70		28		205 00		12	69 50	84 80		22		155 00
	10	52 10	64 70		20		115 80		30		229 30		14	77 30	93 20		24		175 70
	12	58 30	71 50		22		134 20	67	6	48 40	61 30		16		106 00		26		198 60
	14	65 20	79 00		24		154 00		8	54 10	67 60		18		117 40		28		222 50
	16		90 20		26		175 70		10	59 20	73 30		20		128 80		30		247 40
	18		99 70		28		198 30		12	66 30	81 00		22		149 20		6	55 30	69 70
	20		110 60		30		222 10		14	73 60	88 90		24		169 50		8	60 80	75 80
	22		128 70	65	8	45 80	58 10		16		101 20		26		191 90		10	66 20	81 80
	24		148 00		8	51 40	64 30		18		112 20		28		215 60		12	74 20	90 40
	26		169 00		10	56 30	69 80		20		123 40		30		240 40		14	82 80	99 60
	28		191 40		12	63 00	77 10		22		142 80	70	6	52 40	66 20		16	93 90	113 10
	30		214 60		14	70 20	84 90		24		163 20		8	58 10	72 50		18		124 80
63	6	43 20	54 90		16		96 90		26		185 50		10	63 40	78 40		20		137 40
	8	48 60	60 90		18		107 20		28		208 50		12	71 10	86 70		22		157 80
	10	53 50	66 40		20		118 30		30		232 90		14	79 20	95 40		24		178 70
	12	59 80	73 30		22		137 00	68	6	49 70	62 90		16		108 40		26		202 00
	14	66 80	80 90		24		157 20		8	55 40	69 20		18		119 90		28		225 90
	16		92 40		26		178 80		10	60 60	75 00		20		131 80		30		251 20
	18		102 20		28		201 60		12	68 00	83 00		22		152 30				
	20		113 10		30		225 40		14	75 40	91 00		24		172 80				

Diam. in inch.	Face in inch.	Single Belt.	Double Belt.	Double Arm. Belt.	Diam. in inch.	Face in inch.	Single Belt.	Double Belt.	Double Arm. Belt.	Diam. in inch.	Face in inch.	Single Belt.	Double Belt.	Double Arm. Belt.	Diam. in inch.	Face in inch.	Single Belt.	Double Belt.	Double Arm. Belt.
74	8	\$58 90	\$75 75		78	8	\$64 75	\$82 35		82	8	\$70 65	\$89 55		90	8	\$104 75		
	9	63 40	81 90			9	69 70	89 10			9	75 90	96 70			9	112 80		
	10	68 00	88 50			10	74 70	95 90			10	81 30	103 85			10	121 00		
	11	72 75	94 80			11	79 80	102 85			11	86 80	111 15			11	129 40		
	12	77 60	101 00			12	85 00	110 00			12	92 30	118 65			12	138 00		
	14	87 65	114 45			14	95 65	124 50			14	104 05	134 50			14	155 60		
	16	98 00	128 25			16	106 65	139 25			16	116 20	150 65			16	173 40		
	18		142 50			18		154 50			18		167 10			18	191 50		
	20		157 10	\$180 65		20		170 30	\$195 85		20		183 90	\$211 48		20	210 70	\$242 30	
	22		172 00	197 80		22		186 10	214 00		22		200 70	230 80		22	230 05	264 55	
	24		187 00	215 05		24		202 00	232 30		24		218 00	250 70		24	249 50	286 95	
	26			232 10		26			250 65		26			269 85		26		309 30	
	28			249 25		28			269 05		28			289 50		28		331 70	
	30			266 45		30			287 45		30			309 10		30		354 15	
	32			283 60		32			305 90		32			328 90		32		376 65	
	34			300 85		34			324 30		34			348 55		34		389 05	
	36			317 95		36			342 70		36			368 20		36		421 50	
	38			335 10		38			361 10		38			388 00		38		443 90	
	40			352 30		40			379 50		40			407 65		40		466 30	
76	8	61 80	79 05		80	8	67 65	85 95		84	8	73 65	93 25		96	8	117 10		
	9	66 50	85 50			9	72 80	92 90			9	79 10	100 50			9	125 85		
	10	71 30	92 70			10	78 00	99 85			10	84 65	107 85			10	134 75		
	11	76 25	99 30			11	83 30	106 95			11	90 30	115 35			11	143 85		
	12	81 30	105 50			12	88 60	114 30			12	96 00	123 00			12	153 00		
	14	91 60	119 45			14	99 85	129 50			14	108 35	139 60			14	172 10		
	16	102 30	133 75			16	111 40	144 95			16	121 00	156 40			16	191 75		
	18		148 45			18		160 80			18		173 50			18	212 50		
	20		163 70	188 25		20		177 10	203 65		20		190 75	219 35		20	233 00	267 95	
	22		179 00	205 85		22		193 40	222 40		22		208 10	239 30		22	254 50	292 70	
	24		194 50	223 70		24		210 00	241 50		24		225 50	259 30		24	276 00	317 40	
	26			241 30		26			260 20		26			279 50		26		341 55	
	28			259 15		28			279 30		28			299 75		28		365 70	
	30			276 90		30			298 25		30			320 05		30		390 45	
	32			294 75		32			317 40		32			340 40		32		415 15	
	34			312 55		34			336 35		34			360 75		34		439 65	
	36			330 30		36			355 45		36			381 10		36		464 15	
	38			348 00		38			374 55		38			401 45		38		488 65	
	40			366 00		40			383 55		40			421 80		40		513 15	

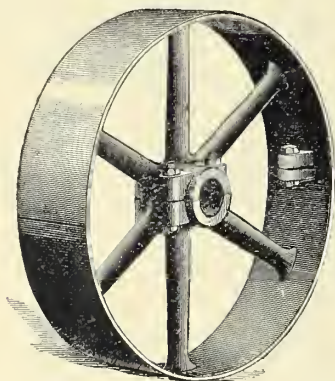
FINISHED PULLEYS.—Continued.

Diam. in inch.	Face, in inch.	Double Belt.	Single Belt.	Double Arm, Double Belt.	Diam. in inch.	Face, in inch.	Double Belt.	Single Belt.	Double Arm, Double Belt.	Diam. in inch.	Face, in inch.	Double Belt.	Single Belt.	Double Arm, Double Belt.	Diam. in inch.	Face, in inch.	Double Belt.	Single Belt.	Double Arm, Double Belt.
102	8		\$130 75		108	8		\$144 35		114	8		\$159 45		120	8		\$172 85	
	9		140 70			9		154 75			9		170 75			9		184 60	
	10		150 75			10		165 35			10		182 10			10		196 55	
	11		160 85			11		176 10			11		193 50			11		208 65	
	12		171 00			12		187 00			11		205 00			12		221 00	
	14		192 00			14		209 50			14		228 40			14		246 10	
	16		213 40			16		232 50			16		252 45			16		271 75	
	18		233 50			18		256 00			18		277 00			18		298 00	
	20		256 25	\$294 70		20		280 20	\$322 25		20		303 00	\$348 50		20		325 90	\$374 80
	22		279 05	320 90		22		304 55	350 25		22		329 50	379 40					
	24		302 00	347 30		24		329 00	378 35		24		356 00	409 40					
	26			373 70		26			406 35		26			439 60					
	28			400 15		28			434 35		28			470 00					
	30			426 60		30			462 70		30			500 60					
	32			453 10		32			491 05		32			531 30					
	34			479 65		34			519 35		34			562 00					
	36			506 25		36			547 65		36			592 50					
	38			532 80		38			575 90		38			623 10					
	40			559 35		40			604 20		40			653 70					

Note.—For Pulleys with bore less than 1¼ inch no discount from list prices will be given. Write for discounts. Can also furnish Patent Steel Rim Pulleys in above sizes. Prices on application. Additional prices for Clamp, Hub, Split, Tight and Loose and Flange Pulleys.

PULLEYS.—SPLIT, CLAMP, HUB, FLANGE AND TIGHT AND LOOSE.

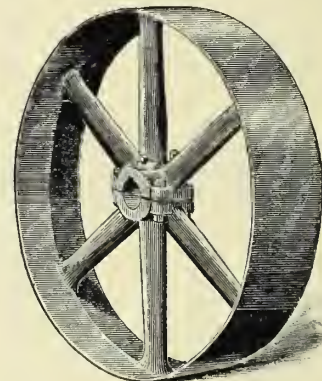
FIG. 1803.



Additional prices, to be added to regular list prices in order to obtain list prices for Split Pulleys, cast iron.

Diameter in Inches.	Width of Face.	Additional Price.	Diameter in Inches.	Width of Face.	Additional Price.
6 to 12	3 to 4	\$1 40	37 to 47	6 to 10	\$10 00
	5 to 6	1 60		11 to 14	13 00
	7 to 10	2 00		15 to 20	18 00
	11 to 14	2 50			
13 to 18	3 to 4	1 50	48 to 60	6 to 10	12 50
	5 to 6	2 00		11 to 14	18 00
	7 to 10	2 50		15 to 20	25 00
	11 to 14	3 50		21 to 30	34 00
19 to 23	3 to 4	2 60	61 to 84	6 to 10	20 00
	5 to 6	3 20		11 to 14	25 00
	7 to 10	4 00		15 to 20	35 00
	11 to 14	5 00		21 to 30	48 00
	15 to 20	6 60		31 to 40	64 00
24 to 30	4 to 6	4 00	85 to 144	up to 14	38 00
	7 to 10	5 00		15 to 20	53 50
	11 to 14	6 50		21 to 30	70 00
	15 to 20	9 00		31 to 40	90 00
31 to 36	4 to 6	5 00			
	7 to 10	6 00			
	11 to 14	8 50			
	15 to 20	11 50			

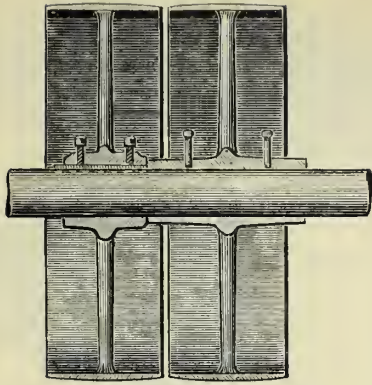
FIG. 1804.



Additional prices, to be added to regular list prices in order to obtain list prices for Clamp Hub Pulleys.

Diameter in Inches.	Width of Face.	Additional Price.	Diameter in Inches.	Width of Face.	Additional Price.
6 to 12	3 to 4	\$ 85	37 to 47	6 to 10	\$6 00
	5 to 6	1 00		11 to 14	8 00
	7 to 10	1 20		15 to 20	10 00
	11 to 14	1 50			
13 to 18	3 to 4	90	48 to 60	6 to 10	7 50
	5 to 6	1 20		11 to 14	10 00
	7 to 10	1 50		15 to 20	15 00
	11 to 16	2 10		21 to 30	20 00
19 to 23	3 to 4	1 60	61 to 84	6 to 10	12 00
	5 to 6	2 00		11 to 14	15 00
	7 to 10	2 40		15 to 20	21 00
	11 to 14	3 00		21 to 30	28 00
	15 to 20	4 00		31 to 40	38 40
24 to 30	4 to 6	2 50	85 to 144	up to 14	22 80
	7 to 10	3 00		15 to 20	32 10
	11 to 14	4 00		21 to 30	42 00
	15 to 20	5 40		31 to 40	54 00
31 to 36	4 to 6	3 00			
	7 to 10	3 60			
	11 to 14	5 00			
	15 to 20	7 00			

FIG. 1805.

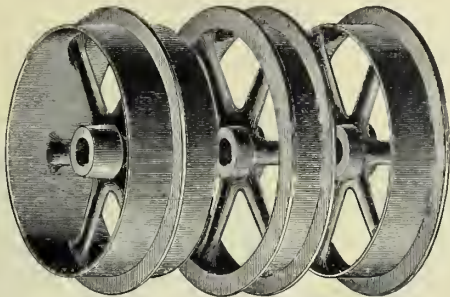


Additional prices, to be added to regular list prices in order to obtain list prices for tight and loose pulleys (per pair), patented steel rim or cast iron.

Diameter in Inches.	Additional Price per Pair.	Diameter in Inches.	Additional Price per Pair.
6 to 8	\$1 50	31 to 32	\$5 30
9 to 10	1 75	33 to 34	5 60
11 to 12	2 00	35 to 36	6 00
13 to 14	2 35	37 to 40	6 50
15 to 16	2 70	41 to 44	7 00
17 to 18	3 00	45 to 48	7 75
19 to 20	3 35	49 to 52	8 40
21 to 22	3 70	53 to 56	9 00
23 to 24	4 00	57 to 60	9 70
25 to 26	4 30	61 to 66	10 50
27 to 28	4 60	67 to 72	12 50
29 to 30	5 00		

Tight and loose pulleys are always made with crowning faces, while pulleys that drive them are made with flat faces.

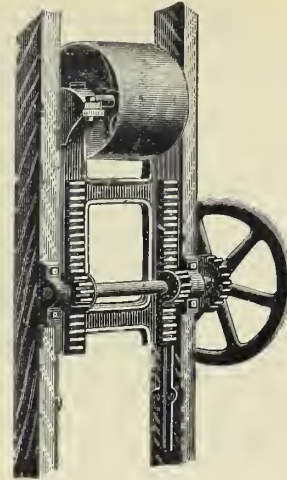
FIG. 1807.



Additional prices, to be added to regular list prices in order to obtain list prices for finished flange pulleys. Made to order with one, two or three flanges.

Diameter in Inches.	Additional Price for each Flange.	Diameter in Inches.	Additional Price for each Flange.
6 to 8	\$2 00	31 to 32	\$7 70
9 to 10	2 30	33 to 34	8 40
11 to 12	2 60	35 to 36	9 20
13 to 14	2 85	37 to 40	10 40
15 to 16	3 25	41 to 44	11 80
17 to 18	3 60	45 to 48	13 35
19 to 20	4 00	49 to 52	15 00
21 to 22	4 50	53 to 56	16 30
23 to 24	5 00	57 to 60	18 30
25 to 26	5 50	61 to 66	20 80
27 to 28	6 20	67 to 72	23 25
29 to 30	7 00		

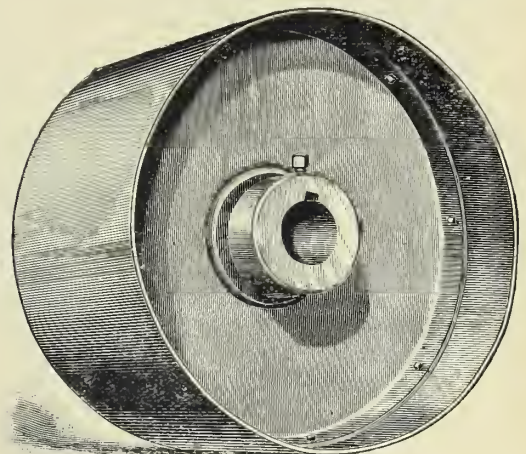
FIG. 1806.



BELT TIGHTENERS.

Diameter and face of pulley.	Length of adjustment.	Diameter of shaft.	Floor length.	Floor width.	Price, with iron side frames.	Price, without iron frames.
	In.		Ft. In.	Ft. In.		
12 x 9	18	1 1/4	3 5	2 7 1/4	\$60.00	\$48.00
18 x 12	18	1 1/2	3 11	2 10 1/4	80.00	64.00
20 x 14	18	1 3/4	4 1	3 0 1/4	100.00	80.00
20 x 16	18	1 1/2	4 1	3 2 1/4	110.00	88.00
28 x 18	24	1 1/2	5 3	3 4 1/4	120.00	96.00
28 x 20	24	1 1/2	5 3	3 6 1/4	140.00	112.00
30 x 22	24	2 3/8	5 5	3 8 1/4	160.00	128.00
30 x 24	24	2 3/8	5 5	3 10 1/4	200.00	160.00
36 x 28	30	2 7/8	6 5	4 2 1/4	250.00	200.00
36 x 32	30	2 7/8	6 5	4 6 1/4	320.00	256.00
36 x 36	30	2 7/8	6 5	4 10 1/4	400.00	320.00
36 x 40	36	2 7/8	6 5	5 2 1/4	500.00	400.00

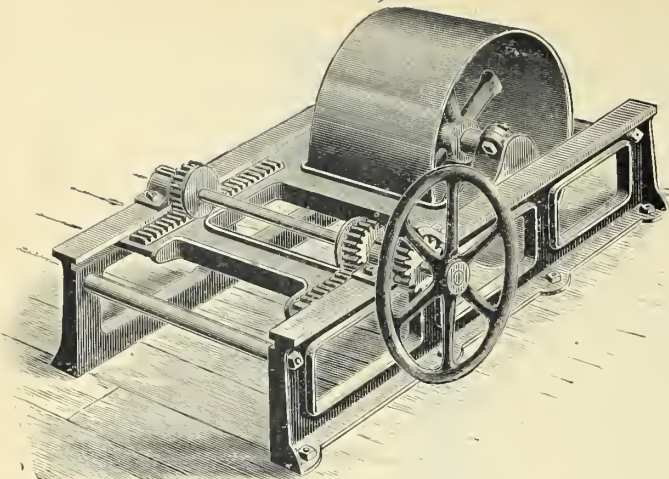
FIG. 1808.



WEB PULLEY.

These Pulleys are manufactured with cast iron webs and steel rims, or of solid cast iron. They are extensively used on dynamos. Prices quoted on application.

FIG. 1809.



IRON FRAME BELT TIGHTENER.

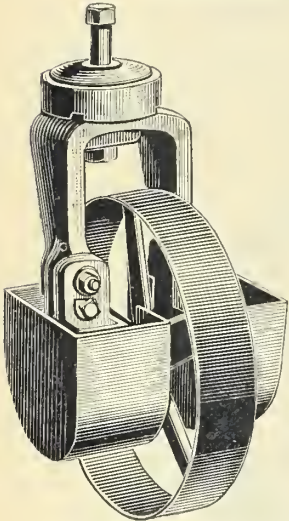
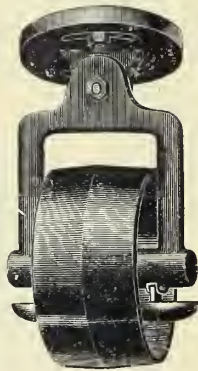


FIG. 1811.

FIG. 1811a.



GUIDE OR GALLOWS PULLEY AND FRAME.

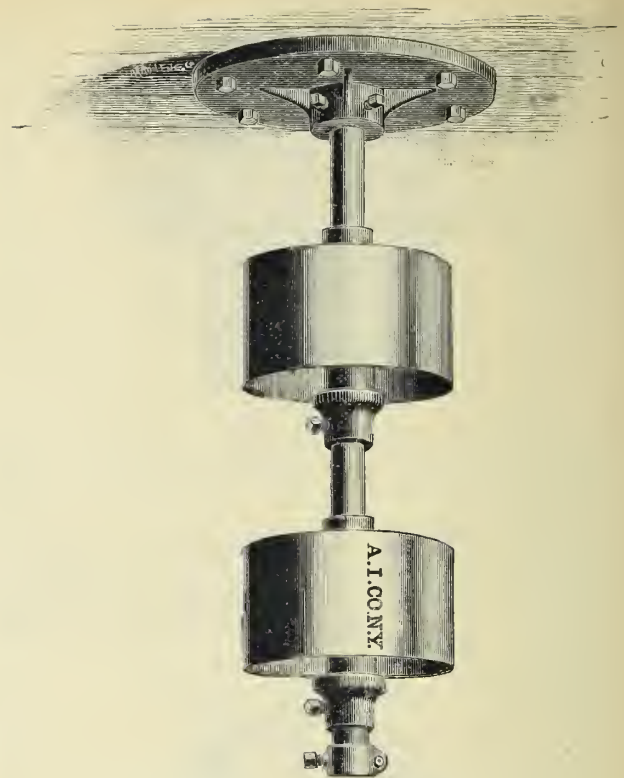
No. 1.	With 10 x 4 inch pulley,	- - -	\$12.00
"	With 10 x 8 inch pulley,	- - -	18.00
No. 2.	With 18 x 4 inch pulley,	- - -	18.00
"	With 18 x 8 inch pulley,	- - -	25.00

THE FALLS PATENT FRICTION CLUTCH CUT-OFF COUPLINGS.

Largest Shaft to which Clutch can be Fitted. Inches.	Diameter of Clutch. Inches.	Space on Shaft. Inches.	Horse Power 100 Rev.	Price of Coupling Complete.
2	12	15 1/4	3	\$45 00
3 1/4	14	15 1/4	4	50 00
3 1/4	16	17 3/8	5	55 00
4	18	18 1/8	7	60 00
4 1/4	20	18 1/4	10	73 00
4 1/4	22	21 1/8	14	85 00
4 1/2	24	23 3/4	19	100 00
4 1/2	26	23 3/4	23	110 00
4 1/2	28	24 1/4	26	118 00
4 3/4	30	26 7/8	30	125 00
5 1/2	33	27	34	140 00
6	36	29 1/8	53	160 00
6 3/4	40	32 1/8	75	260 00
7	42	34 1/8	90	270 00
7 1/4	48	38	105	360 00
9	54	40 1/8	175	460 00
9 1/2	60	43	280	700 00
11	72	48	410	850 00

The horse power indicated above is for four arms. A corresponding increase will be obtained if six-arm clutch is used. We have patterns for six-arm clutches in principal sizes, and prices will be quoted upon application.

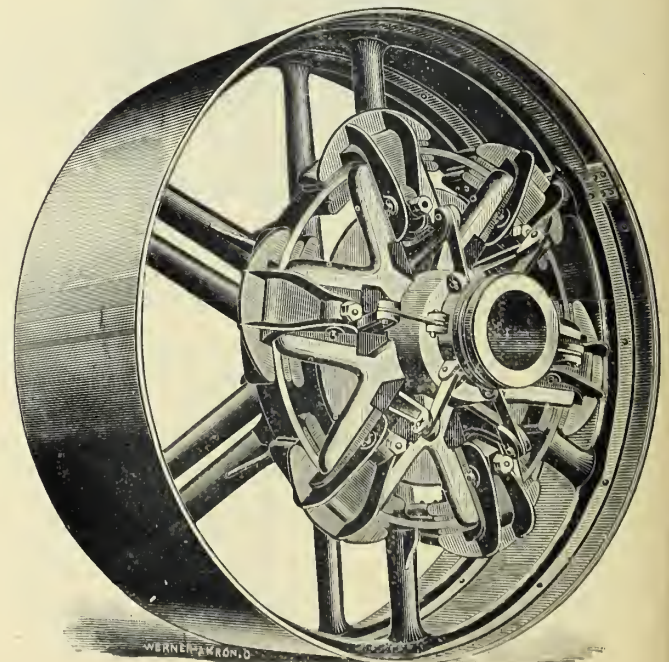
FIG. 1810.



STATIONARY MULE PULLEY STAND.

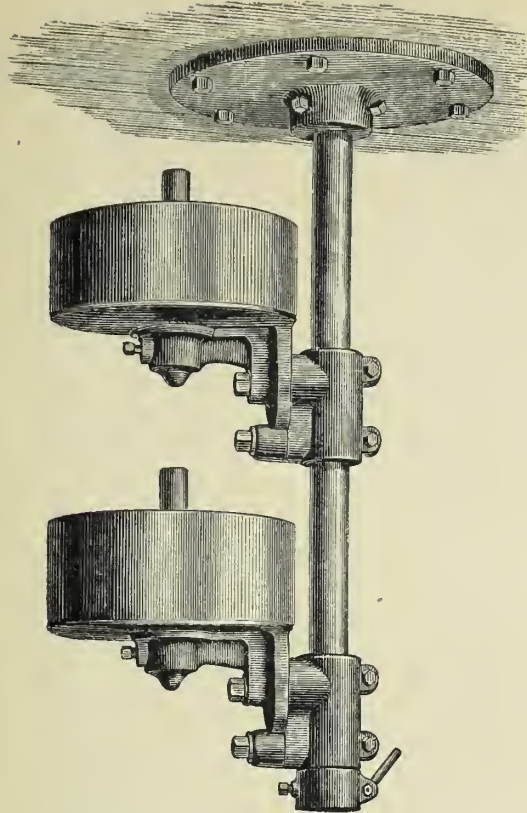
For 2 inch Belt, with 2 Pulleys, 10 x 3 inches,	- - -	\$22.50
" 3 " " " 2 " 10 x 4 "	- - -	25.00
" 4 " " " 2 " 12 x 5 "	- - -	30.00
" 5 " " " 2 " 12 x 6 "	- - -	32.00
" 6 " " " 2 " 16 x 7 "	- - -	37.50
" 7 " " " 2 " 16 x 8 "	- - -	40.00
" 8 " " " 2 " 24 x 10 "	- - -	60.00
" 10 " " " 2 " 24 x 12 "	- - -	65.00
" 12 " " " 2 " 30 x 14 "	- - -	100.00

FIG. 1812.



SIX ARM CLUTCH.

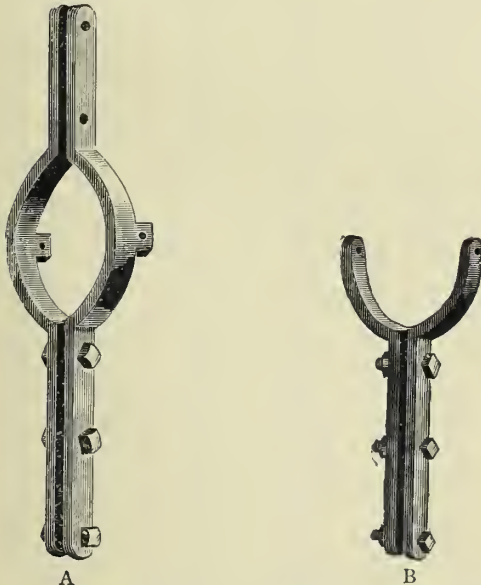
FIG. 1813.



ADJUSTABLE MULE PULLEY STAND.

For 4 inch Belt, with 2 Pulleys, 12 x 5 inches, - - -	\$60.00
" 5 " " " 2 " 12 x 6 " - - -	62.00
" 6 " " " 2 " 16 x 7 " - - -	75.00
" 7 " " " 2 " 16 x 8 " - - -	78.00
" 8 " " " 2 " 16 x 9 " - - -	85.00
" 10 " " " 2 " 24 x 12 " - - -	112.00
" 12 " " " 2 " 30 x 14 " - - -	160.00

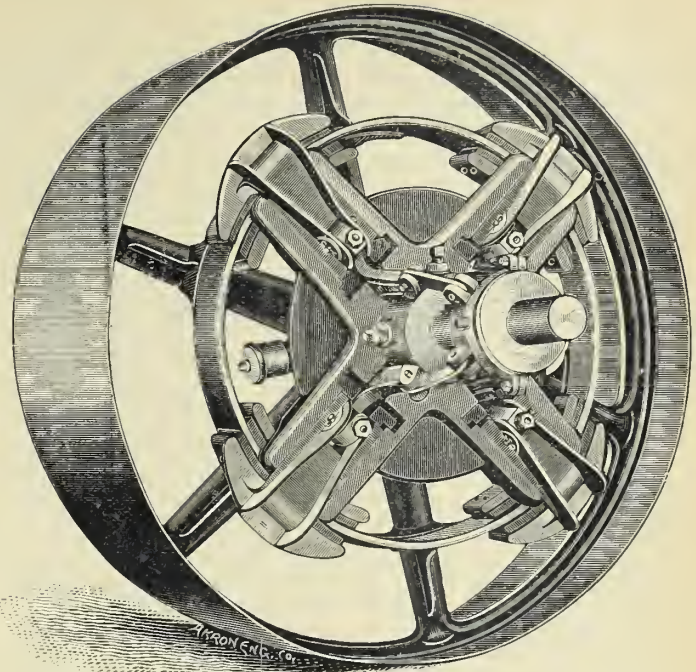
FIG. 1815.



SHIFTER FORKS.

"A" represents a long fork designed for use when the lever fulcrum is located on the opposite side of shaft from the operator.
 "B" represents a short fork designed for use when the fulcrum is located between operator and shaft.

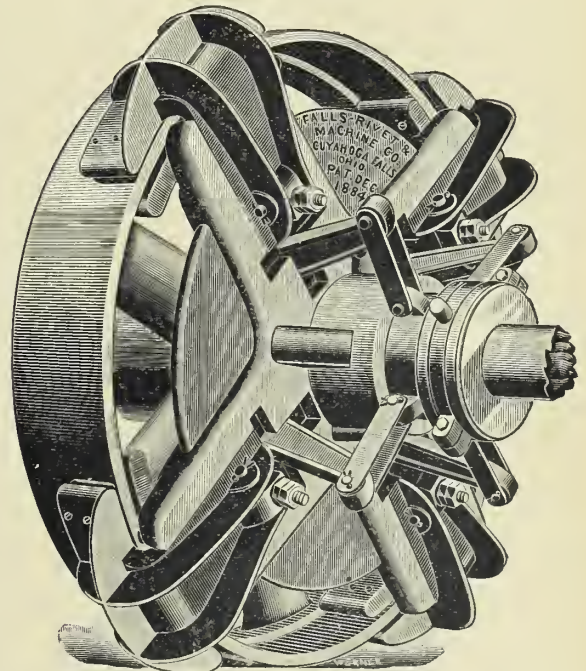
FIG. 1814.



STEEL RIM PULLEY WITH FOUR ARM CLUTCH.

There is absolutely no contact of frictional surfaces when not "in clutch." The operation of clutching and releasing is so easy that it can be readily accomplished by moving the cone by hand, unaided by the lever.

FIG. 1816.



FOUR ARM FRICTION CLUTCH CUT-OFF COUPLING.

Operates upon the same principle as the Friction Clutch Pulleys. The ring is keyed to the driving shaft and the clutch to the driven, or vice versa, permitting of the instantaneous stopping or starting of that portion of the shafting which lies beyond the clutch.

They are perfectly balanced, fitted with straight keys and set-screws, and may be run at any speed desired.

BALANCED FRICTION CLUTCH PULLEYS.

WITH FOUR OR SIX ARMS, ACCORDING TO AMOUNT OF POWER TO BE TRANSMITTED, AND WITH STEEL RIMS.

THE Steel Rim Pulleys are about 40 per cent. lighter than ordinary cast iron pulleys, but at the same time much stronger. For these reasons they are especially well adapted for use in connection with Friction Clutches, there being much less friction on bearings, wearing of sleeves and strain on shaft than there would be with heavier pulleys.

Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.
16	4	17	3 25	\$29 00	25	7	21	14 50	\$47 65	30	14	32	34 90	\$83 45	35	14	33	40 50	\$102 25
	5	18	4 00	30 15		8	22	16 60	49 65		15	33	37 40	87 65		15	34	43 62	107 35
	6	19	4 50	31 25		9	23	18 70	51 70		16	34	39 25	92 00		16	35	46 20	112 70
	7	20	6 00	33 50		10	24	20 80	53 85		17	35	42 20	96 60		17	36	49 50	118 35
	8	21	7 50	35 00		11	25	22 80	56 05		18	36	44 50	101 45		18	37	51 35	124 25
17	4	17	4 15	30 00		12	26	24 90	58 40	31	5	19	12 86	56 10	36	5	19	14 96	68 80
	5	18	5 20	31 25		13	27	27 00	60 85		6	20	15 40	58 90		6	21	17 90	72 20
	6	19	6 50	33 20		14	28	29 00	63 35		7	21	18 00	61 85		7	22	20 90	75 80
	7	20	7 75	34 25	26	4	18	8 60	43 90		8	25	20 58	64 95		8	23	23 50	79 60
	8	21	9 80	35 75		5	19	10 82	46 10		9	26	23 00	68 15		9	24	26 25	83 60
18	4	17	5 67	31 70		6	20	12 90	48 40		10	26	25 73	71 55		10	27	29 10	87 75
	5	18	7 08	32 95		7	21	15 00	50 80		11	27	28 30	75 15		11	28	32 15	92 15
	6	19	8 50	34 30		8	22	17 25	53 35		12	28	30 50	78 90		12	29	35 25	96 75
	7	20	10 02	35 65		9	23	19 40	56 00		13	29	33 20	82 90		13	30	38 50	101 60
	8	21	11 34	37 10		10	24	21 50	58 80		14	32	36 00	87 05		14	33	41 00	106 65
19	4	17	6 13	33 00		11	25	23 80	61 75		15	33	38 59	91 35		15	34	44 50	112 00
	5	18	7 66	34 30		12	28	25 75	64 80		16	34	41 10	95 90		16	35	47 10	117 55
	6	19	9 20	35 70		13	29	28 00	68 05		17	35	43 50	100 70		17	38	50 20	123 45
	7	20	10 73	37 10		14	30	30 10	71 45		18	36	46 31	105 75		18	39	53 25	129 60
	8	21	12 26	38 60		15	31	32 25	75 05	32	5	19	13 28	58 40		19	40	56 25	136 10
	9	22	13 80	40 15		16	32	34 50	78 80		6	20	15 94	61 30		20	41	59 25	142 90
20	4	18	6 30	34 30		5	18	11 10	47 65		7	21	18 60	64 40	37	5	19	15 25	71 50
	5	19	7 88	35 70		6	20	13 40	50 05		8	25	21 20	67 60		6	20	18 25	75 05
	6	20	9 45	37 10		7	21	15 70	52 55		9	26	23 90	70 95		7	21	21 25	78 80
	7	21	11 03	38 60		8	22	17 90	55 15		10	27	26 56	74 50		8	25	24 50	82 75
	8	22	12 60	40 15		9	23	20 00	57 90		11	28	29 22	78 20		9	26	27 50	86 90
	9	23	14 18	41 75		10	24	22 10	60 80		12	29	32 88	82 15		10	27	30 76	91 25
	10	24	15 75	43 40		11	25	24 70	63 80		13	30	34 24	86 25		11	28	33 80	95 80
21	12	26	17 90	57 85		12	29	26 50	67 00		14	31	37 19	90 55		12	31	36 50	100 55
	4	18	6 80	35 70		13	29	29 10	70 35		15	32	39 60	95 05		13	32	39 90	105 60
	5	19	8 51	37 10		14	30	31 25	73 85		16	34	42 20	99 80		14	33	43 00	110 85
	6	20	10 21	38 60		15	31	33 50	77 55		17	35	45 10	104 80		15	34	46 00	116 40
	7	21	11 91	40 15		16	32	35 80	81 40		18	36	46 81	110 05		16	35	49 00	122 20
	8	22	13 41	41 75	28	5	19	11 50	49 65		5	19	13 50	60 85		17	37	52 00	128 30
	9	23	15 31	43 40		6	19	13 90	52 15	33	6	20	16 10	63 90		18	38	55 25	134 70
	10	24	17 01	45 15		7	21	16 21	54 75		7	21	19 10	67 10		19	39	58 25	141 45
	11	25	18 71	46 95		8	22	18 50	57 45		8	22	21 50	70 45		20	40	61 25	148 50
22	12	26	20 41	48 80		9	23	20 25	60 35		9	23	24 10	73 95	38	5	19	15 80	74 35
	4	18	7 29	37 30		10	24	23 20	63 35		10	26	27 15	77 65		6	20	18 50	78 05
	5	19	9 14	38 85		11	25	25 50	66 50		11	28	30 00	81 65		7	23	22 12	81 95
	6	20	10 96	40 45		12	28	27 92	69 80		12	29	32 05	85 70		8	24	25 29	86 05
	7	21	12 79	42 15		13	29	30 25	73 30		13	30	34 90	90 00		9	26	28 20	90 35
	8	22	14 62	42 90		14	30	32 50	76 95		14	32	38 00	94 50		10	29	31 00	94 85
	9	23	16 44	45 75		15	31	34 90	80 80		15	33	41 00	98 20		11	30	34 76	99 60
	10	24	18 21	47 65		16	32	37 30	84 85		16	34	43 85	103 15		12	31	37 25	104 60
	11	25	20 10	49 65		17	33	39 50	89 10		17	35	46 53	108 30		13	34	41 00	109 80
	12	26	22 92	51 70		18	34	41 50	93 55		18	36	49 00	113 70		14	34	44 00	115 30
23	4	18	7 69	38 85		5	19	12 00	51 70	34	5	19	14 00	63 35		15	35	47 00	121 05
	5	19	9 61	40 45		6	19	14 40	54 30		6	20	16 90	66 50		16	36	50 50	127 10
	6	20	11 53	42 15		7	21	16 60	57 00		7	21	19 50	69 85		17	37	53 73	133 45
	7	21	13 45	43 90		8	21	19 20	59 85		8	22	22 00	73 30		18	39	56 25	140 10
	8	22	15 37	45 75		9	23	21 70	62 80		9	23	25 15	76 95		19	40	59 90	147 10
	9	23	17 30	47 65		10	24	24 10	65 95		10	27	28 00	80 85		20	41	63 00	154 45
	10	24	19 22	49 65		11	25	26 50	69 25		11	28	31 00	84 45	39	5	19	16 20	77 35
	11	25	21 19	51 70		12	28	28 98	72 70		12	29	33 50	89 10		6	20	19 40	81 20
	12	26	23 05	53 85		13	29	31 15	76 30		13	30	36 50	93 55		7	23	22 25	85 25
24	4	18	8 07	40 45		14	30	33 80	80 15		14	32	39 10	98 20		8	24	25 75	89 55
	5	19	10 08	42 15		15	31	36 23	84 15		15	34	42 30	103 15		9	25	29 00	94 00
	6	20	12 20	43 90		16	32	38 50	88 35		16	36	45 19	108 30		10	28	32 00	98 70
	7	21	14 11	45 75		17	33	41 05	92 75		17	36	48 00	113 70		11	29	35 25	103 65
	8	22	16 13	47 65		18	34	43 45	97 35		18	37	50 50	119 40		12	30	38 50	108 80
	9	23	18 14	49 65		5	19	12 50	53 85	35	5	19	14 54	66 00		13	31	42 00	114 25
	10	24	20 16	51 70		6	20	16 00	56 55		6	20	17 40	69 30		14	34	45 00	119 95
	11	25	22 15	53 85		7	23	17 40	59 35		7	21	20 25	72 70		15	35	48 25	125 95
	12	26	24 50	56 05		8	24	20 00	62 30		8	22	23 20	76 35		16	36	52 25	132 25
	13	27	25 90	58 40		9	25	22 45	65 45		9	23	26 00	80 15		17	37	55 00	138 85
	14	28	27 90	60 85		10	26	24 90	68 70		10	26	29 00	84 15		18	38	57 50	145 80
25	4	18	8 30	42 15		11	27	27 40	72 15		11	28	31 50	88 35		19	39	61 25	153 05
	5	19	10 45	43 90		12	28	29 50	75 75		12	29	35 00	92 75		20	40	64 00	160 70
	6	20	12 45	45 75		13	29	32 25	79 50		13	30	37 50	97 40	40	5	21	16 00	80 40

BALANCED FRICTION CLUTCH PULLEYS.—Continued.

Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.
40	6	22	19 25	\$84 40	43	22	45	75 75	\$207 15	47	16	38	59 90	\$180 95	50	27	51	107 00	\$344 70	50	27	51	107 00	\$344 70
	7	23	23 00	88 65		23	46	79 00	217 50		17	39	64 20	190 00		28	52	111 25	361 95		28	52	111 25	361 95
	8	27	26 25	93 05		24	47	82 00	228 36		18	41	68 10	199 50		51	6	24 25	25 00		51	6	24 25	25 00
	9	28	29 50	99 70	44	5	24	18 00	94 05		19	42	72 00	209 45		7	25	29 00	132 55		7	25	29 00	132 55
	10	29	33 00	102 60		6	25	21 00	98 75		20	43	76 00	217 90		8	26	30 00	139 15		8	26	30 00	139 15
	11	30	36 50	107 70		7	26	25 00	103 70		21	44	78 50	228 80		9	27	37 00	146 10		9	27	37 00	146 10
	12	31	39 50	113 10		8	27	28 00	108 85		22	45	83 00	240 25		10	32	41 00	153 40		10	32	41 00	153 40
	13	32	43 27	118 75		9	28	32 00	114 30		23	46	86 00	252 25		11	33	45 00	161 05		11	33	45 00	161 05
	14	33	45 00	124 70		10	32	35 00	120 00		24	47	90 00	264 85		12	34	49 00	169 10		12	34	49 00	169 10
	15	34	48 00	130 90		11	33	39 00	126 00		25	48	94 00	278 10		13	35	53 00	177 55		13	35	53 00	177 55
	16	35	51 25	137 45		12	34	42 00	132 30		26	49	97 25	292 00		14	36	57 00	186 45		14	36	57 00	186 45
	17	36	54 10	144 35		13	35	46 00	138 90	48	5	24	19 50	110 00		15	38	61 00	195 75		15	38	61 00	195 75
	18	39	57 75	151 55		14	36	49 25	145 85		6	25	23 00	115 50		16	39	65 00	205 55		16	39	65 00	205 55
	19	40	61 00	159 15		15	37	53 00	153 15		7	26	27 25	121 25		17	40	69 00	215 80		17	40	69 00	215 80
	20	41	64 00	167 10		16	39	56 00	160 80		8	27	31 50	127 35		18	41	73 00	226 60		18	41	73 00	226 60
	21	43	67 00	174 45		17	40	60 00	168 85		9	28	35 50	133 70		19	42	77 00	237 95		19	42	77 00	237 95
	22	44	69 25	181 20		18	41	63 00	177 30		10	32	39 00	140 35		20	43	80 50	249 80		20	43	80 50	249 80
	23	45	73 00	193 40		19	42	67 00	186 15		11	33	42 50	147 40		21	44	85 00	262 30		21	44	85 00	262 30
	24	46	76 25	203 05		20	43	70 00	195 45		12	34	46 25	154 75		22	45	90 25	274 40		22	45	90 25	274 40
41	5	22	16 50	83 65		21	44	74 00	205 20		13	35	50 25	162 45		23	46	93 25	288 15		23	46	93 25	288 15
	6	23	20 00	87 85		22	45	77 00	215 45		14	36	54 00	170 60		24	48	97 50	302 55		24	48	97 50	302 55
	7	26	23 00	92 20		23	46	81 00	226 25		15	38	58 00	179 15		25	49	102 00	317 65		25	49	102 00	317 65
	8	27	26 50	96 85		24	47	84 00	237 55		16	39	61 25	188 10		26	50	105 25	333 55		26	50	105 25	333 55
	9	28	30 00	101 65	45	5	24	18 00	97 80		17	41	65 00	197 50		27	51	109 25	350 20		27	51	109 25	350 20
	10	31	33 00	106 75		6	25	22 00	102 70		18	42	69 00	207 35		28	52	113 50	367 70		28	52	113 50	367 70
	11	32	36 00	112 10		7	26	25 00	107 80		19	43	73 00	217 70		29	53	117 50	385 15		29	53	117 50	385 15
	12	33	39 50	117 70		8	27	29 00	113 20		20	44	76 50	228 60		30	54	121 50	402 60		30	54	121 50	402 60
	13	34	43 00	123 55		9	28	33 00	118 85		21	45	79 25	240 00		31	55	125 50	420 10		31	55	125 50	420 10
	14	35	46 00	129 70		10	32	36 00	124 80		22	46	84 00	252 00		32	56	129 50	437 60		32	56	129 50	437 60
	15	36	49 00	136 20		11	33	40 00	131 05		23	47	88 00	264 60		33	57	133 50	455 10		33	57	133 50	455 10
	16	38	52 25	143 00		12	34	43 00	137 60		24	49	91 75	277 85		34	58	137 50	472 60		34	58	137 50	472 60
	17	39	56 00	150 15		13	35	47 00	144 50		25	50	95 50	291 70		35	59	141 50	490 10		35	59	141 50	490 10
	18	40	59 00	157 65		14	36	50 25	151 70		26	51	99 25	306 30		36	60	145 50	507 60		36	60	145 50	507 60
	19	41	62 00	165 55		15	37	54 25	159 30	49	5	24	20 00	114 40		37	61	149 50	525 10		37	61	149 50	525 10
	20	42	66 00	173 80		16	39	58 10	167 25		6	25	24 00	120 10		38	62	153 50	542 60		38	62	153 50	542 60
	21	43	69 00	182 50		17	40	61 50	175 60		7	26	27 75	126 10		39	63	157 50	560 10		39	63	157 50	560 10
	22	44	72 00	191 70		18	41	65 50	184 40		8	27	31 50	132 40		40	64	161 50	577 60		40	64	161 50	577 60
	23	46	75 00	201 30		19	42	68 25	193 60		9	28	35 00	139 05		41	65	165 50	595 10		41	65	165 50	595 10
	24	47	78 00	211 35		20	43	72 00	203 30		10	32	39 25	146 00		42	66	169 50	612 60		42	66	169 50	612 60
42	5	23	17 00	86 95		21	44	75 50	213 45		11	33	43 47	153 30		43	67	173 50	630 10		43	67	173 50	630 10
	6	24	20 00	91 30		22	45	79 50	224 10		12	34	47 00	160 95		44	68	177 50	647 60		44	68	177 50	647 60
	7	25	24 00	95 85		23	46	83 00	235 30		13	35	51 54	169 00		45	69	181 50	665 10		45	69	181 50	665 10
	8	26	27 00	100 55		24	47	86 75	247 05		14	36	54 75	177 40		46	70	185 50	682 60		46	70	185 50	682 60
	9	27	30 00	105 55	46	5	24	19 50	101 70		15	38	58 75	186 40		47	71	189 50	700 10		47	71	189 50	700 10
	10	31	33 50	110 85		6	25	22 25	106 80		16	39	62 50	195 70		48	72	193 50	717 60		48	72	193 50	717 60
	11	32	37 00	116 40		7	26	26 50	112 10		17	40	66 25	205 50		49	73	197 50	735 10		49	73	197 50	735 10
	12	33	40 25	122 20		8	27	30 25	117 70		18	42	70 25	215 75		50	74	201 50	752 60		50	74	201 50	752 60
	13	34	44 00	128 30		9	28	33 50	123 60		19	43	74 00	226 55		51	75	205 50	770 10		51	75	205 50	770 10
	14	35	47 00	134 70		10	32	37 50	129 70		20	44	78 00	237 85		52	76	209 50	787 60		52	76	209 50	787 60
	15	36	50 25	141 45		11	33	41 50	136 25		21	45	82 00	249 75		53	77	213 50	805 10		53	77	213 50	805 10
	16	38	53 75	148 50		12	34	44 25	143 05		22	46	86 00	262 20		54	78	217 50	822 60		54	78	217 50	822 60
	17	39	57 00	155 95		13	35	48 50	150 20		23	47	89 50	275 30		55	79	221 50	840 10		55	79	221 50	840 10
	18	40	60 00	163 75		14	36	52 25	157 70		24	48	93 75	289 05		56	80	225 50	857 60		56	80	225 50	857 60
	19	41	64 00	171 90		15	37	55 75	165 55		25	49	97 50	303 50		57	81	229 50	875 10		57	81	229 50	875 10
	20	43	67 00	180 50		16	39	59 25	173 85		26	50	101 25	318 70		58	82	233 50	892 60		58	82	233 50	892 60
	21	44	70 00	189 50		17	40	63 50	182 55	50	6	24	24 00	123 75		59	83	237 50	910 10		59	83	237 50	910 10
	22	45	74 00	199 00		18	41	66 75	191 65		7	25	28 00	129 95		60	84	241 50	927 60		60	84	241 50	927 60
	23	46	77 00	208 95		19	42	69 95	201 25		8	26	32 00	136 40		61	85	245 50	945 10		61	85	245 50	945 10
	24	47	80 00	219 35		20	43	74 25	211 30		9	27	36 00	143 30		62	86	249 50	962 60		62	86	249 50	962 60
43	5	24	18 00	90 45		21	44	77 25	221 25		10	32	40 00	150 45										

BALANCED FRICTION CLUTCH PULLEYS.—Continued.

Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	
54	11	33	47 50	\$170 95	57	16	40	73 00	\$231 40	60	30	57	143 00	\$473 00	72	18	45	103 00	\$370 30	
	12	34	52 00	179 50		17	41	77 00	242 95		32	58	153 00	515 55		20	47	115 00	396 25	
	13	35	56 00	188 45		18	44	82 00	254 10		34	60	162 00	561 95		22	49	126 00	423 95	
	14	36	60 00	197 85		19	45	86 00	266 80		36	61	172 00	612 55		24	51	138 00	453 65	
	15	37	65 00	207 75		20	46	90 25	280 10		38	29	40 00	207 15		26	53	149 00	485 40	
	16	40	69 00	218 15		21	47	95 00	294 10		40	32	50 00	224 75		28	55	160 00	519 35	
	17	41	73 00	229 05		22	48	100 25	308 80		42	35	59 00	242 70		30	56	172 00	555 70	
	18	43	77 25	240 50		23	49	104 00	324 25		44	39	69 00	262 10		32	47	00	262 10	
	19	44	81 25	252 50		24	50	109 00	340 45		46	42	79 00	283 10	74	10	34	59 00	283 05	
	20	45	86 00	265 15		25	51	113 00	357 45		48	45	89 00	305 70		12	36	71 00	305 70	
	21	46	89 25	278 40		26	52	118 00	375 35		50	46	99 00	330 15		14	38	83 00	330 15	
	22	47	94 00	292 30		27	53	122 00	394 10		52	48	109 00	355 55		16	43	94 00	353 25	
	23	48	99 00	306 90		28	54	127 00	413 80		54	50	118 00	384 00		18	45	106 00	378 00	
	24	49	103 00	322 25		29	55	131 00	434 50		56	52	128 00	414 75		20	47	118 00	404 45	
	25	50	107 00	338 35		30	56	136 00	451 85		58	54	138 00	447 90		22	49	130 00	432 75	
	26	51	111 50	355 25	58	6	25	28 00	144 95		60	56	148 00	483 75		24	51	141 00	463 05	
	27	52	116 00	373 00		7	26	33 00	152 20		62	58	158 00	522 40		26	53	153 00	495 45	
	28	53	120 00	391 65		8	29	37 00	159 80		64	60	167 00	569 45		28	55	165 00	530 10	
55	6	25	26 50	136 60		9	30	42 00	167 75		66	62	177 00	620 55		30	57	177 00	567 20	
	7	26	31 00	143 45		10	31	46 00	176 15		68	8	30	41 00	215 45	76	8	32	49 00	272 60
	8	27	35 00	150 65		11	32	51 00	184 95		70	10	32	51 00	232 70		10	34	61 00	294 40
	9	28	39 50	158 15		12	33	55 75	194 20		72	12	37	61 00	251 30		12	36	73 00	315 00
	10	32	44 00	166 05		13	37	60 00	203 90		74	14	39	71 00	271 40		14	38	85 00	337 05
	11	33	48 25	174 35		14	38	65 00	214 10		76	16	42	82 00	293 10		16	43	97 00	360 65
	12	34	53 00	183 05		15	39	69 00	224 80		78	18	44	92 00	316 55		18	45	109 00	385 90
	13	35	57 00	192 20		16	40	74 00	236 05		80	20	46	102 00	341 85		20	47	121 00	412 90
	14	38	61 25	201 80		17	41	79 00	247 85		82	22	48	112 00	369 20		22	49	133 00	441 80
	15	39	66 00	211 85		18	42	83 00	260 21		84	24	50	122 00	398 75		24	51	145 00	472 70
	16	40	70 00	222 45		19	43	88 00	273 25		86	26	52	132 00	430 60		26	53	157 00	505 80
	17	41	74 25	233 55		20	46	92 00	286 90		88	28	54	142 00	465 05		28	55	169 00	541 20
	18	44	79 00	245 25		21	47	97 00	301 25		90	30	56	153 00	502 25		30	63	181 00	579 05
	19	45	83 00	257 50		22	48	101 00	316 30		92	32	59	163 00	542 45		32	50	00	283 50
	20	46	87 50	270 35		23	49	106 00	332 10		94	34	61	173 00	585 85	78	10	34	62 00	303 35
	21	47	92 00	283 55		24	50	111 00	348 70		96	36	63	183 00	632 70		12	36	75 00	324 55
	22	48	96 25	298 05		25	51	115 00	366 15		98	8	30	42 00	224 05		14	38	87 00	347 30
	23	49	100 75	312 95		26	52	120 00	384 45	66	10	32	53 00	241 95		16	43	100 00	371 60	
	24	51	105 00	328 60		27	53	124 00	403 65		12	38	63 00	261 30		18	45	112 00	397 60	
	25	52	109 00	345 05		28	54	129 00	423 85		14	40	74 00	282 20		20	51	124 00	425 40	
	26	53	114 00	362 30		29	55	134 00	445 00		16	42	81 00	304 80		22	53	137 00	455 20	
	27	54	118 00	380 40		30	56	138 00	467 25		18	44	95 00	329 15		24	55	150 00	487 05	
	28	55	122 00	399 40	59	6	25	29 00	147 85		20	46	105 00	355 50		26	57	161 00	521 15	
56	6	25	27 00	139 35		7	26	33 00	155 25		22	48	116 00	383 95		28	59	174 00	567 60	
	7	26	31 50	146 30		8	28	38 00	163 00		24	50	126 00	414 65		30	61	186 00	596 65	
	8	27	36 00	153 60		9	29	43 00	171 15		26	52	136 00	447 80	80	10	34	64 00	315 00	
	9	31	40 25	161 30		10	30	47 00	179 50		28	55	147 00	483 60		12	36	77 00	337 60	
	10	32	45 00	169 35		11	31	52 00	188 45		30	57	157 00	522 30		14	41	89 00	361 25	
	11	33	49 00	177 80		12	32	57 00	197 85	68	8	30	44 00	233 00		16	43	102 00	386 50	
	12	34	54 00	186 70		13	35	61 00	207 75		10	36	54 00	251 65		18	49	115 00	413 55	
	13	35	58 00	196 05		14	36	66 00	218 15		12	38	65 00	271 75		20	51	128 00	442 50	
	14	38	62 75	205 85		15	37	71 00	229 05		14	40	76 00	293 50		22	53	140 00	473 45	
	15	39	67 00	216 10		16	42	75 00	240 50		16	42	87 00	314 30		24	55	153 00	506 60	
	16	40	71 00	226 90		17	43	80 00	252 50		18	44	98 00	339 45		26	57	166 00	542 10	
	17	41	76 00	238 25		18	44	85 00	265 15		20	46	108 00	366 60		28	59	178 00	580 00	
	18	44	80 00	250 75		19	45	89 00	278 40		22	48	119 00	395 90		30	61	191 00	620 60	
	19	45	85 75	263 30		20	46	94 00	292 30		24	50	130 00	427 85	82	10	34	66 00	328 10	
	20	46	89 00	276 45		21	47	99 00	306 90		26	52	141 00	462 05		12	36	79 00	351 10	
	21	47	93 75	290 30		22	48	103 00	322 25		28	54	151 00	494 40		14	41	92 00	375 65	
	22	48	99 00	304 80		23	49	108 00	338 35		30	56	162 00	529 00		16	47	105 00	401 95	
	23	49	102 00	320 00		24	50	113 00	355 25		32	58	173 00	566 00		18	49	118 00	430 10	
	24	51	107 00	336 00		25	51	117 00	373 00	70	8	31	45 00	242 35		20	51	131 00	460 15	
	25	52	111 00	352 80		26	52	122 00	391 65		10	33	56 00	261 75		22	53	144 00	492 40	
	26	53	115 75	370 45		27	53	127 00	411 25		12	35	67 00	282 65		24	55	157 00	526 85	
	27	54	120 00	388 95		28	54	131 00	430 10		14	37	78 00	305 25		26	57	170 00	563 70	
	28	55	124 75	408 40		29	55	136 00	452 00		16	43	89 00	329 70		28	59	183 00	603 15	
	29	56	129 00	428 80		30	56	141 00	470 05		18	45	100 00	356 05		30	61	196 00	645 40	
	30	57	133 25	450 25	60	8	29	39 00	199 20		20	47	112 00	384 55	84	10	37	67 00	341 20	
57	6	25	27 50	142 10		10	32	48 00	215 15		22	49	123 00	415 30		12	39	81 00	365 10	
	7	26	32 00	149 20		12	35	58 00	232 35		24	51	134 00	444 35		14	41	94 00	390 65	
	8	27	36 50	156 65		14	38	67 00	250 90		26	53	145 00	475 45		16	47	107 00	418 00	
	9	28	41 00	164 50		16	40	77 00	271 00		28	55	156 00	508 75		18	49	121 00	447 25	
	10	33	45 75	172 70		18	42	86 00	292 65		30	57	167 00	544 35		20	51	134 00	478 55	
	11	34	50 00	181 35		20	44	96 00	316 05	72	8	31	46 00	252 05		22	53	147 00	512 05	
	12	35	55 00	190 40		22	48	105 00	341 35		10	33	58 00	272 20		24	55</			

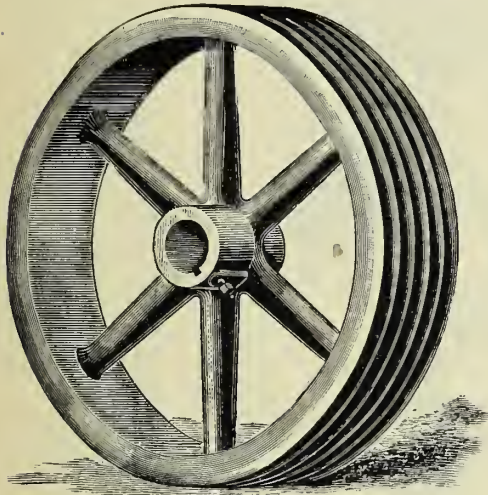
BALANCED FRICTION CLUTCH PULLEYS.—Continued.

WITH FOUR OR SIX ARMS, ACCORDING TO AMOUNT OF POWER TO BE TRANSMITTED, AND WITH STEEL RIMS.

The Steel Rim Pulleys are about 40 per cent. lighter than ordinary cast iron pulleys, but at the same time much stronger. For these reasons they are especially well adapted for use in connection with Friction Clutches, there being much less friction on bearings, wearing of sleeves and strain on shaft than there would be with heavier pulleys.

Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.	Diam. of Pulley.	Face of Pulley.	Space on Shaft including Collar.	H. P. 100 Rev.	Price of Clutch and Pulley.
90	12	39	86 00	\$410 60	96	16	43	122 00	\$520 80	102	22	52	178 00	\$728 65	114	28	62	240 00	\$1004 05
	14	41	101 00	439 35		18	49	138 00	565 80		24	58	195 00	779 65		30	64	258 00	1074 35
	16	43	115 00	470 10		20	51	153 00	605 40		26	60	211 00	834 20		14	48	127 00	703 35
	18	49	129 00	503 00		22	53	168 00	647 75		28	62	227 00	892 60		16	50	145 00	752 60
	20	51	143 00	538 20		24	55	183 00	693 10		30	64	243 00	955 10		18	52	163 00	805 25
	22	53	158 00	575 85		26	57	199 00	741 60	108	14	44	120 00	625 30		20	54	181 00	861 60
	24	55	172 00	616 15		28	63	214 00	793 55		16	46	138 00	669 05		22	56	199 00	921 90
	26	57	186 00	659 30		30	65	229 00	849 05		18	48	155 00	715 90		24	58	217 00	986 45
	28	59	201 00	705 45	102	14	44	114 00	555 90		20	54	172 00	766 00		26	60	236 00	1050 50
	30	61	215 00	754 85		16	46	130 00	594 80		22	56	189 00	819 65		28	62	254 00	1129 35
96	12	39	92 00	461 85		18	48	146 00	636 45		24	58	206 00	877 10		30	64	272 00	1208 40
	14	41	107 00	494 20		20	50	162 00	681 00		26	60	223 00	938 40					

FIG. 1817.



SHEAVES OR GROOVED PULLEYS.

FOR MANILLA OR HEMP ROPES.

We are prepared to furnish these sheaves from 3 feet to 30 feet pitch diameter, with any number of grooves required.

TABLE OF THE HORSE POWER OF TRANSMISSION ROPE, BY C. W. HUNT.

The working strain is 800 lbs. for a 2 inch diameter rope and is the same at all speeds, due allowance having been made for loss by centrifugal force.

Dia. Rope Inches.	SPEED OF THE ROPE IN FEET PER MINUTE.										Smallest Dia. Pulleys. Ins.
	1500	2000	2500	3000	3500	4000	4500	5000	6000	7000	
3/4	3.3	4.3	5.2	5.8	6.7	7.2	7.7	7.7	7.1	4.9	30
7/8	4.5	5.9	7.0	8.2	9.1	9.8	10.8	10.8	9.3	6.9	36
1	5.8	7.7	9.2	10.7	11.9	12.8	13.6	13.7	12.5	8.8	42
1 1/4	9.2	12.1	14.3	16.8	18.6	20.0	21.2	21.4	19.5	13.8	54
1 1/2	13.1	17.4	20.7	23.1	26.8	28.8	30.6	30.8	28.2	19.8	60
1 3/4	18.0	23.7	28.2	32.8	36.4	39.2	41.5	41.8	37.4	27.6	72
2	23.1	3.8	36.8	42.8	47.6	51.2	54.4	54.8	50.0	35.2	84

Prices given on application.

PRENTISS TOOL & SUPPLY CO.

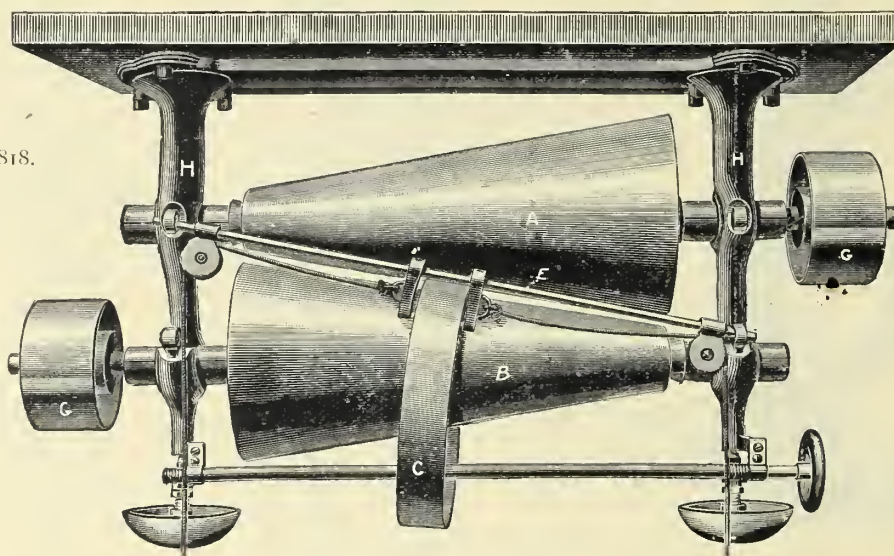
FRICION CONE COUNTERSHAFTING.

Forty seven different patterns, transmitting from one to forty horse power, changing the speed of all kinds of machinery while running.
Thousands in use. Send for special catalogue.

Read the following directions for ordering.

In order to determine the smallest size of cone pulleys to drive any machine, the pulley "G" on the end of cone "B" should not be larger in diameter than the middle of cones, and the face of the pulley the same width as the friction belt "C." If the diameter is increased for the sake of speed (not power) the width of its face should be decreased in proportion.

FIG. 1818.



HANGING PATTERN No. 5.

Represents a set of hanging pulleys, made especially for driving machinery from overhead, and to take the place of common countershafts having step cones. Any speed desired may be obtained while the machine is running, by pulling belt, C, from end to end of cone, by means of cords connected with shipper traveling on rod, E, through which belt, C, revolves. These cords may be connected at any point convenient to operator.

Diameters, 4 inches and 12 inches; length, 24 inches; working variation, 120 to 765. Is intended for machinery that requires frequent change, such as wood and iron turning.

HANGING SIZES. THESE PRICES DO NOT INCLUDE PULLEYS, G, G.

No.	Diam. Small End. Inches.	Diam. Large End. Inches.	Length of Cone. Inches.	Width of Belt. Inches.	Drop of Cone. Inches.	Variation of Cones.	Variation of Driven Cone Speed.	Transmitting Power equal to Pulley. Diam. Face If not Overworked.		Diam. of Shaft, Inches.	Weight Complete.	Horse Power.	Price.
2	2	6	12	2	5 1/4	100 to 900	125 to 720	4	2	13-16	100		\$30 00
4	3	5	12	2	5 1/4	180 to 500	195 to 455	4	2	13-16	115		35 00
6	3	9	16	3	7 1/4	100 to 900	130 to 710	6	3	1 1-16	125		40 00
8	4	8	16	3	7 1/4	150 to 600	175 to 520	6	3	1 1-16	130		45 00
10	4	12	24	3	9 1/4	100 to 900	120 to 765	8	3	1 7-16	350		60 00
12	5	10	24	4	9 1/4	150 to 600	170 to 530	8	4	1 7-16	375		60 00
13	6	12	24	4	9 1/4	150 to 600	170 to 530	9	4	1 7-16	400		65 00
Subject to a discount of								per cent.					

Horse power is rated at 300 revolutions of driver—belt in center of cone—with 1000 feet of belting one inch wide, per minute for one horse power.

FIG. 1819.

FIG. 1820.

FIG. 1821.

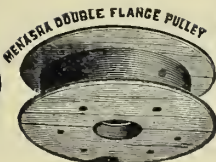
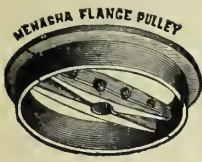
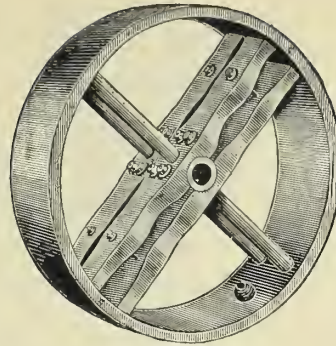
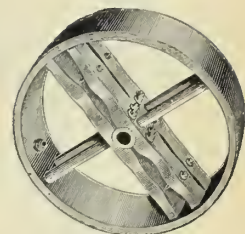


FIG. 1822.



40 IN. DIAMETER.

FIG. 1823.

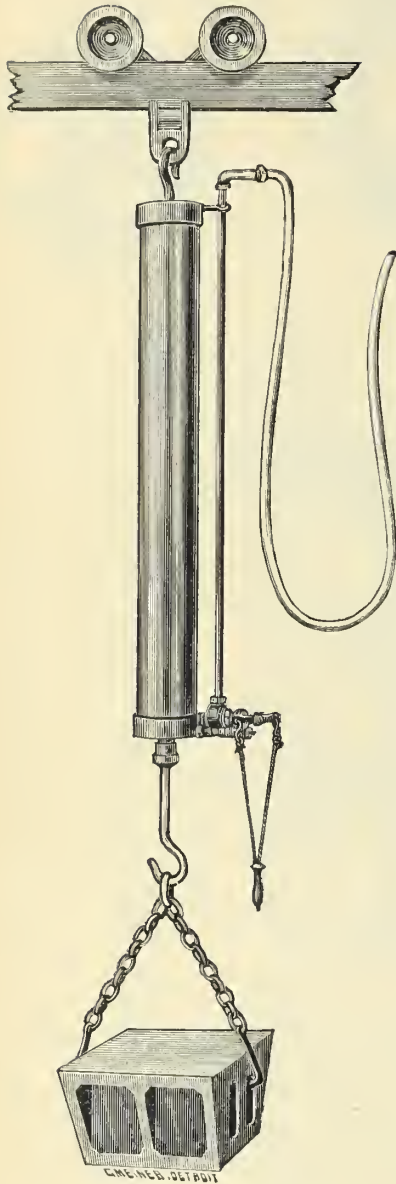


24 IN. DIAMETER.

PATENT WOOD SPLIT PULLEYS.

Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	Diam. Inches.	Face, Inch.	Price.	
9	3	\$2.50	15	11	\$6.15	20	6	\$6.00	24	7	\$8.05	27	9	\$10.63	30	11	\$14.90	33	12	\$18.95	36	13	\$24.50	42	21	\$53.50	50	11	\$37.25	
	4	2.65		12	6.50		7	6.60		8	8.80		10	11.75		12	16.50		13	21.45		14	26.50		22	56.00		12	39.00	
	5	2.90		13	6.85		8	7.15		9	9.65		11	13.25		13	18.75		14	23.62		15	29.45		23	59.00		13	41.50	
	6	3.15		14	7.20		9	7.60		10	10.45		12	14.72		14	21.00		15	26.25		16	32.40		24	63.00		14	44.00	
	7	3.28					10	8.00		11	11.55		13	16.47		15	23.20		16	28.87		17	34.70		25	68.00		15	47.00	
	8	3.40		16	3.30		11	8.75		12	12.70		14	18.25		16	25.40		17	31.12		18	37.00					16	50.00	
10	3	2.60		4	3.65		12	9.50		13	13.90		15	20.17		17	27.70		18	33.37		20	41.50	44	6	19.50		17	53.00	
	4	2.75		5	4.05		13	10.25		14	15.10		16	21.90		18	30.00		20	37.00		21	43.50		7	21.65		18	56.00	
	5	3.00		6	4.60		14	11.00		15	16.30		17	23.70		20	34.50		21	39.50		22	45.50		8	23.75		20	65.00	
	6	3.25		7	5.05		15	11.80		16	17.50		18	25.50		21	36.25		22	41.50		23	47.50		9	25.65		21	69.75	
	7	3.40		8	5.50		16	12.60		17	18.75		20	32.25		22	38.45		23	43.50		24	49.50		10	27.50		22	74.50	
	8	3.55		9	5.90		17	13.60		18	20.00		21	34.25		23	40.25		24	45.50		25	51.00		11	29.50		23	79.50	
	9	3.72		10	6.30		18	14.70		20	28.50		22	36.25		24	42.25		25	47.75					12	31.50		24	85.50	
	10	3.90		11	6.65					21	30.50		23	38.25		25	45.50							38	6	14.50		25	90.00	
				12	7.00	21	4	4.70		22	32.50		24	40.75											13	33.75				
				13	7.35		5	5.60		23	35.50		25	44.00	31	4	8.40	34	4	9.60		6	16.05		14	36.00		52	8	34.00
11	3	2.70		14	7.70		6	6.40		24	37.50					5	9.00		5	10.50		7	17.60		15	38.40		9	36.00	
	4	2.85		15	8.05		7	6.95		25	41.00	28	4	7.20		6	9.85		6	11.50		8	19.15		16	40.75		10	38.00	
	5	3.10					8	7.50					5	7.80		7	11.02		7	13.00		9	20.70		17	43.35		11	40.00	
	6	3.35		17	3.50		9	8.10	25	4	5.80		6	8.60		8	12.20		8	14.50		10	24.75		18	46.00		12	42.00	
	7	3.53		8	3.85		10	8.65		5	6.65		7	9.45		9	13.17		9	15.75		11	26.75		19	48.00		13	44.00	
	8	3.70		9	4.25		11	9.55		6	7.60		8	10.30		10	14.13		10	17.00		12	28.60		20	54.00		14	46.00	
	9	3.90		10	4.85		12	10.40		7	8.40		9	11.20		11	15.68		11	18.50		13	31.50		21	56.50		15	49.50	
	10	4.10		11	5.35		13	11.20		8	9.20		10	12.10		12	17.20		12	20.00		14	34.50		22	62.00		16	52.50	
12	3	2.80		8	5.85		14	12.00		9	9.85		11	13.70		13	19.52		13	22.50		15	39.25		23	67.00		17	56.50	
	4	2.95		9	6.30		15	12.85		10	10.90		12	15.25		14	21.87		14	24.50		16	45.00	46	6	22.00		20	68.00	
	5	3.20		10	6.70		16	13.70		11	12.15		13	17.10		15	24.22		15	27.25		17	47.00		7	24.00		21	72.50	
	6	3.55		11	7.10		17	14.70		12	13.40		14	19.00		16	26.57		16	30.00		18	49.00		8	26.00		22	77.00	
	7	3.70		12	7.50		18	15.80		13	14.80		15	21.00		17	28.85		17	32.25		19	51.50		9	28.00		23	81.50	
	8	3.85		13	7.88					14	16.25		16	23.00		18	31.12		18	34.50		20	54.00		10	30.00		24	86.25	
	9	4.08		14	8.25		15	17.70		15	17.70		17	24.95		20	35.37		20	38.75		22	58.00		11	31.75		25	93.00	
	10	4.30		15	9.05	22	4	4.95		16	19.10		18	26.90		21	37.25		21	40.75		23	60.00		12	33.50				
	11	4.70		16	9.50		5	5.90		17	20.55		19	27.50		22	39.25		22	42.75		24	63.00	40	6	16.00		13	37.50	
	12	5.10		17	10.40		6	6.85		18	22.00		20	30.00		23	41.25		23	44.75		25	66.00		7	17.50		14	39.25	
13	3	2.90		4	4.05		7	7.45		20	32.00		22	37.00		24	43.25		24	46.75					8	19.00		15	41.50	
	4	3.10		5	4.55		8	8.00		21	34.00		23	39.00		25	46.00		25	49.00					9	20.75		16	43.00	
	5	3.40		6	5.10		9	8.70		22	36.50		24	41.50	32	4	8.80	35	4	10.10		6	20.75		10	22.50		17	45.50	
	6	3.75		7	5.65		10	9.40		23	38.00		25	44.50		5	9.40		5	11.20		7	22.50		11	24.65		18	48.00	
	7	4.00		8	6.20		11	10.30		24	39.00					6	10.30		6	12.25		8	24.65		12	26.75		19	49.50	
	8	4.25		9	6.65		12	11.20		25	42.50	39	4	7.60		7	11.60		7	13.75		9	26.75		13	28.85		20	52.50	
	9	4.53		10	7.10		13	12.10					5	8.20		8	12.90		8	15.25		10	28.85		14	31.00		21	55.50	
	10	4.80		11	7.55		14	13.00	26	4	6.35		6	9.00		9	15.00		9	16.65		11	31.00		15	33.65		22	60.00	
	11	5.20		12	8.00		15	13.60		5	7.00		7	9.95		10	18.05		10	18.05		12	33.65		16	36.25		23	64.50	
	12	5.60		13	8.50		16	14.20		6	7.95		8	10.90		11	19.62		11	19.62		13	36.25		17	38.50		24	72.00	
				14	9.00		17	15.60		7	8.80		9	11.80		12	21.25		12	21.25		14	41.50		18	41.50		25	78.00	
				15	9.80		18	17.00		8	9.60		10	12.67		13	24.50		13	24.50		15	48.00		19	48.00		26	83.00	
				16	10.70					9	10.05		11	14.20		14	27.90		14	27.90		16	50.50	48	6	24.50		27	87.75	
				17	11.75		19	13.00		10	11.40		12	15.87		15	30.30		15	30.30		17	52.50		7	26.25		28	92.50	
				18	13.00	23	4	5.20		11	12.80		13	17.92		16	32.25		16	32.25		18	55.00		8	28.00		29	98.00	
							5	6.15		12	14.20		14	20.00		17	33.47		17	33.47		19	58.00		9	30.50		30		
				4	4.25		6	7.05		13	15.85		15	22.10		18	35.75		18	35.75		20	63.00		10	32.50				
				5	4.80		7	7.70		14	17.50		16	24.20		19	37.00		19	37.00		21	66.00		11	34.25		31	40.50	
				6	5.50		8	8.40		15	19.15		17	26.32		20	38.25	</												

FIG. 1824.



THE PNEUMATIC HOIST.

AIR HOISTS have become a standard tool in well-equipped machine shops. Their merits are well known. We desire to call special attention to the new governor valve that is applied to these air hoists. This valve is so constructed that by pulling on the cord on the left air is admitted to the cylinder, thus raising the piston; and by pulling on the right cord the exhaust port is opened, causing the weight to lower. By pulling vertically on the handle attached to both cords the cross bar becomes horizontal, closing both entrance and exhaust ports, and stopping the piston whether it be raising or lowering. When the ports admitting air to the cylinder are wide open, bodies of any weight from the unloaded piston to the extreme capacity of the hoist will be lifted at the same rate of speed throughout. With the ports wide open a light load is not jerked up suddenly, as would be the case with an ordinary stop valve, but is carried just as slowly as is the heaviest one.

The speed at which bodies are raised can also be regulated by means of the milled head shown on the lower side of the valve. By unscrewing this head, thereby reducing the tension of an enclosed spiral spring, the air secures more rapid admission into the piston with consequent increase of speed of weight raised. By tightening the head, the quantity of air entering the piston in a given time is reduced, and the speed of lifting correspondingly diminished. The speed of lowering is altered by means of a small screw which changes the size of opening of exhaust port. The special advantage of this valve is its economical use of air, only enough of which is used to do the required work. The mechanism of the valve is so simple that it cannot easily get out of order or fail to work. Wherever these hoists have been used they have given perfect satisfaction.

There is provided on the hoists of 8 inches diameter and over an automatic shut-off valve, which can be set to shut off

the air at any point in the stroke of the piston. This prevents the hoist when not in use—even if the regular valve is left open—from becoming a storage tank of air at the same pressure as that in the main reservoir.

Air hoists are made with any capacity from 500 pounds to 5 tons, and with any lift from 4 to 10 feet. They have been made to fit shop cranes, to run on radial tracks, and to attach to small traveling cranes. We invite correspondence, and will cheerfully furnish any further information. We also furnish a small rotary air motor, an illustration of which is here given. This motor runs equally well in either direction, the shaft having a speed of about 700 revolutions per minute, and with an air pressure of 80 pounds per square inch, developing two horse power. This motor is self-lubricating, oil being admitted to the working parts only when the machine is in use. It has been applied to a 10 ton traveling crane with a span of 50 feet, one motor being geared to the hoisting mechanism, and another being used to propel the crane forward and back. The motor can be readily applied to a boom derrick or shop crane, and can be operated with steam as well as air.

FIG. 1825.

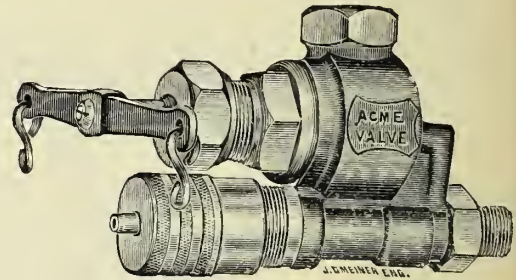


FIG. 1826.

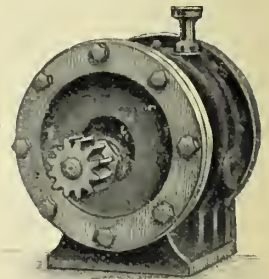


FIG. 1827.

PATENT ECONOMIC SAFETY HOISTS.

WITH TWO-SPEED BLOCKS.

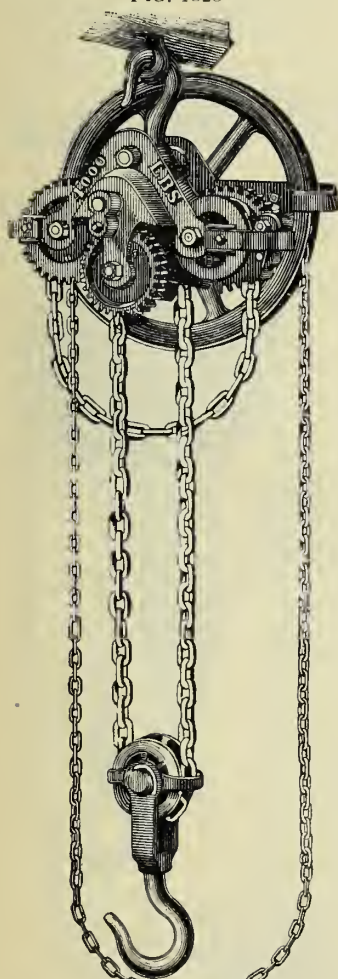
These hoists are spur geared, they have an automatic brake which does not absorb any of the applied power for raising a load and acts automatically whenever the load hangs suspended from the hoist. For lowering the load pull slightly on the opposite side of the hand chain. They have two speeds, the regular or slow speed for the full capacity of the hoist, and the fast speed (twice the former) for lighter loads. In all of Speidel's hoists one man can lift the full load up to 8000 pounds capacity, two men up to 16,000 pounds, and for the largest sizes made not more than three men are required, making this the best and strongest hoist on the market

Hoist up to 4000 pounds safe working capacity.

Capacity of Hoist Pounds.	Price of Hoist Complete with Chain.	Height of Lift. Feet.	Weight Complete with Chain Pounds.	Price for Each Foot of Extra Lift.	Shortest Distance between Hooks Ft. In.
500	\$20 00	8	25	\$ 80	19
1000	25 00	8	40	90	21
2000	30 00	8	61	1 00	24
3000	40 00	8	88	1 25	28
4000	55 00	9	130	1 40	32
6000	75 00	10	175	1 60	34
8000	95 00	10	240	1 90	34
10000	120 00	12	300	2 20	3 0
12000	140 00	12	345	2 75	3 4
16000	175 00	12	400	3 25	3 9
20000	250 00	12	645	3 75	4 0
30000	350 00	12	842	5 00	4 4

Discount, . . . per cent.

FIG. 1828.



2-TON.

PORTABLE CHAIN HOIST.

TEAL PATENT.

Quick hoisting and lowering of empty hook by pulling on lift-chain. No complicated mechanism, being built with direct acting spur gears, and using the differential principle.

Small sprocket wheels, insuring a proper seating of the chain, and provided with chain guides.

Self oilers, so constructed as to prevent leakage in any position.

No worm gearing to run dry and cut. Steel hooks and best material throughout.

All spur gears, giving great ease and speed in use with a minimum expenditure of power.

Two speeds of lift on 5, 6, 8 and 10-ton sizes.

ONE SPEED LIFT.

Capacity.	Price.	Lift.	Extra Lift, Per Foot.	Weight Complete.	Shortest Distance from Hook to Hook
¼ ton	\$22 50	8 feet.	\$ 80	27 pounds.	18 inches.
½ "	25 00	8 "	90	47 "	19 "
1 "	30 00	8 "	1 00	73 "	20 "
2 "	50 00	9 "	1 40	147 "	27 "
3 "	70 00	10 "	1 70	193 "	28 "
4 "	95 00	10 "	2 10	236 "	36 "
5 "	125 00	12 "	2 60	308 "	38 "
6 "	160 00	12 "	3 20	350 "	42 "
8 "	225 00	12 "	3 90	675 "	45 "
10 "	300 00	12 "	4 75	825 "	51 "

All sizes above ½ ton have steel gears.

TWO SPEED LIFT.

Capacity.	Price.	Lift.	Extra Lift, Per Foot.	Weight Complete.	Shortest Distance from Hook to Hook
5 tons	\$145 00	12 feet.	\$2 60	335 pounds.	38 inches.
6 "	180 00	12 "	3 20	380 "	42 "
8 "	250 00	12 "	3 90	705 "	45 "
10 "	330 00	12 "	4 75	860 "	51 "

EXTRA LENGTH OF LIFT FOR HOISTS.

In ordering extra lift allow two feet of hand-chain and two feet of lift chain to each foot of lift, and state clearly whether so many feet of Extra Lift are wanted, or so many running feet of Extra Chain.

FIG. 1829



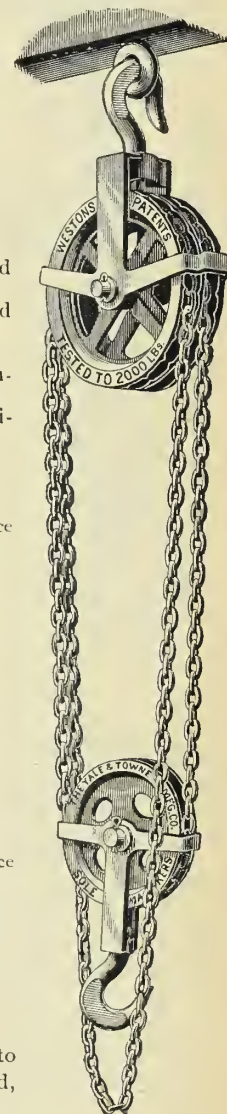
THE WESTON DIFFERENTIAL PULLEY BLOCK.

The name Differential refers to the device for obtaining power, and automatically sustaining the load. This consists of a double differential sheave, cast in one piece, which (without gearing of any kind) performs both of these functions. It is the reduction of a mechanical problem to its simplest terms.

Capacity in Tons.	Price Hoist * Complete.	Price Extra Hoist.	Net Weight in Lbs.
¼	\$13. 5	\$1 72	22
½	15. 6	1 85	30
1	20. 6	1 90	51
1½	25. 6	2 02	81
2	30. 7	2 11	122

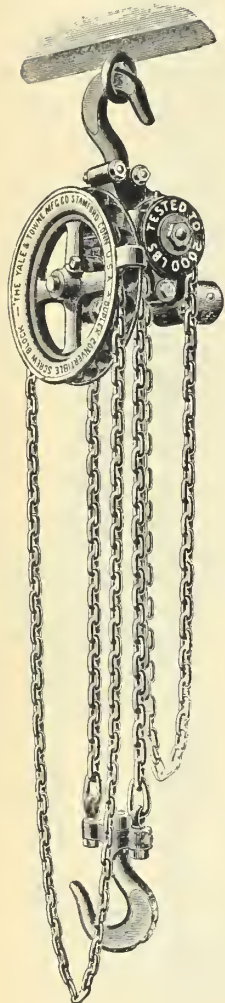
* NOTE — Figures denote height in feet which blocks, with regular lengths of chain, will hoist from level on which operator stands. Each additional foot of hoist requires four feet of additional chain.

FIG. 1830.



PRENTISS TOOL & SUPPLY CO.

FIG 1831.



THE DUPLEX CONVERTIBLE SCREW BLOCK.

Capacity in Tons.	Price Complete.	Hoist.*	Price First Foot.	Extra Hoist. Additional Foot.	Net Weight in Lbs.
½	\$25.00	8	\$1.80	\$1.52	43
1	30.00	8	1.85	1.56	57
1½	40.00	8	1.95	1.60	76
2	55.00	9	2.00	1.64	110
3½	90.00	10	2.25	1.88	210
5	140.00	12	2.40	2.00	340
7	175.00	12	3.55	2.96	378
10	260.00	12	3.85	3.20	570

* NOTE.—Figures denote height in feet which blocks, with regular lengths of chain, will hoist from level on which operator stands.

As indicated by its name Screw Block, the leverage by which the hoisting capacity is obtained is that of a screw or, more properly, a worm and worm wheel. The device by which the load is sustained, and which acts in conjunction with the worm, is capable of *conversion* at the will of the operator so that a Dispatch lowering action may be obtained when so desired.

FIG. 1832.

THE WESTON TRIPLEX SPUR-GEAR BLOCK.

Has any actual efficiency of 79 per cent., or nearly three-fold that of any other block.

The trade name Triplex (Latin for three-fold or triple) has been adopted for this block because it has the three following important features, viz.:

1. A triple gear, having the equivalent of three parallel shafts, each pair geared together.
2. A triple sun-and-planet wheel motion, with three pairs of double pinions, ensuring equal distribution of the load and large wearing surfaces.
3. Three-fold the efficiency of its predecessors.

For sizes *above* two tons capacity the Triplex Block is made in the "*combination*" form, in which, by using as many parts of chain as may be required, the capacity of the Triplex Block may be multiplied to any desired extent, retaining the high efficiency of the direct block.

Two forms of Triplex Combination Block are made, to meet the practical requirements.

Type A is made with a wrought iron yoke, from one end of which the Triplex Block is suspended, while the end of the chain, or in larger sizes, the upper sheave, is held at the other end. The yoke is carried by the single upper hook and the entire combination is self contained. This is the form more generally used, and meets the usual requirements completely.

Type B omits the yoke, and uses instead *two* hooks, the Triplex Block and the upper sheave being separately suspended. This form is adapted for use with trolleys for overhead tramrail, or for permanent suspension from fixed eye-bolts.

The difference between Type A and Type B consists entirely in the mode of suspension; by varying the sheave combinations either form can be adapted to any capacity desired.

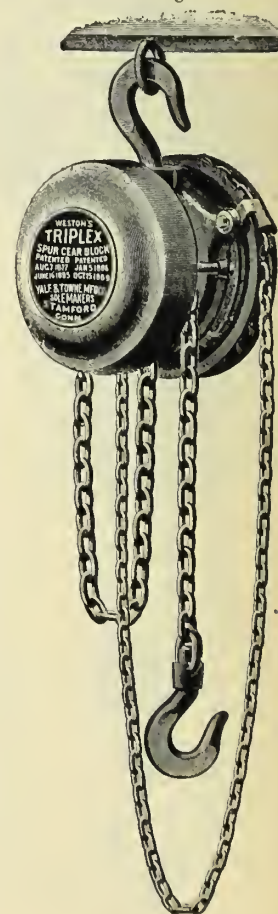
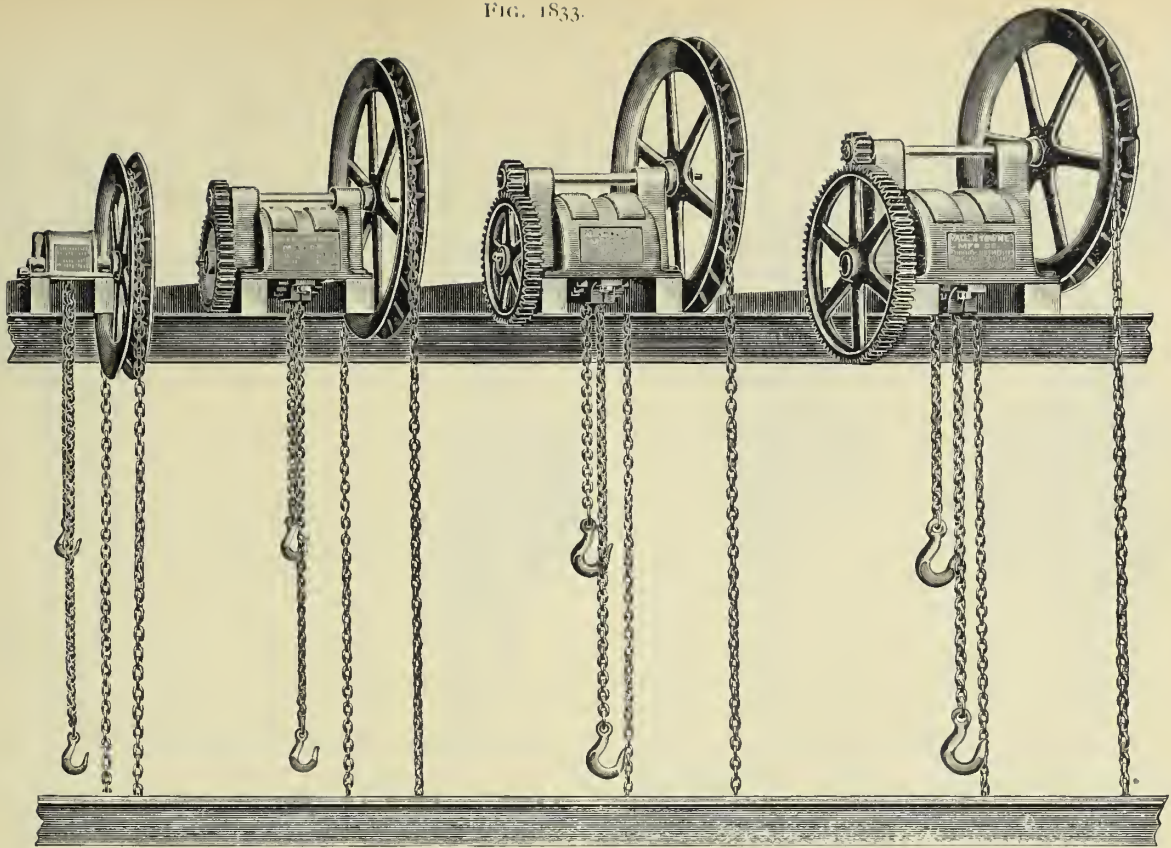


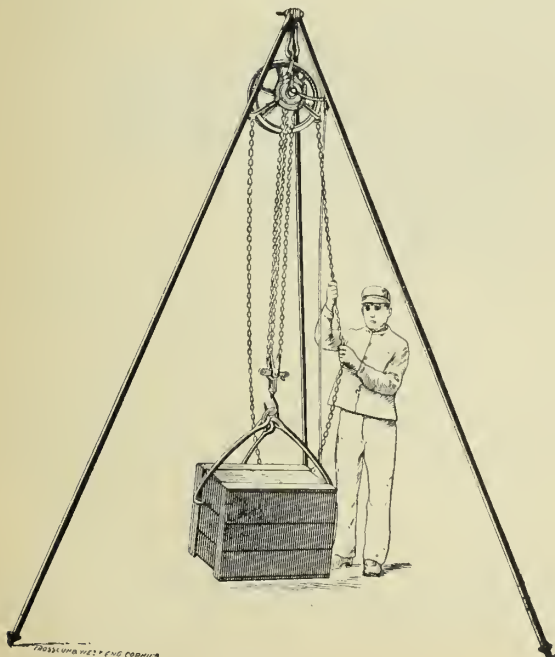
FIG. 1833.



THE WESTON DOUBLE LIFT HOIST.

Capacity in Pounds.	Hoist, Feet.	Distance from center of Rope Wheel to center of Chain Sheave, Inches.	Price, Complete, (except Hand Rope or Chain.)	Price for Extra Hoist, per Foot.	Hand-Rope or Chain extra.	
					Rope.	Chain.
500	16	4 9-16	\$25.00	\$0.40	\$3.00	\$5.00
1000	24	8 5-8	50 00	.44	4 00	7 00
1500	28	9 1-8	65 00	.48	4 50	8.00
2000	32	10 1 8	80.00	.52	5 00	9 00

FIG. 1834.



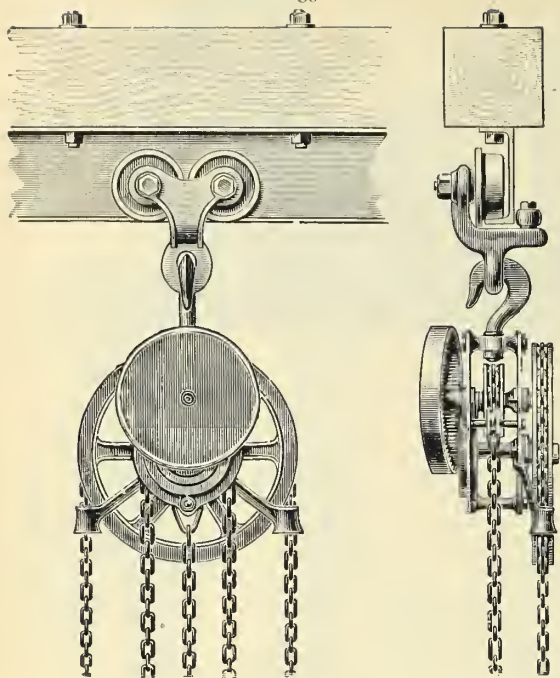
PORTABLE FOLDING DERRICKS.

The cut illustrates our Portable Folding Derricks, which are made in all sizes up to 30000 pounds capacity. Together with our hoist they form a very compact hoisting apparatus and have no equal.

These derricks are made of wrought iron pipe, and can be folded together. They are light, cheap, convenient to handle, and take up little room when not in use. They are always ready, as nothing has to be taken apart which might get lost. They are specially adapted for laying heavy sewer pipes, for erecting monuments, for use in stone yards, factories, &c.

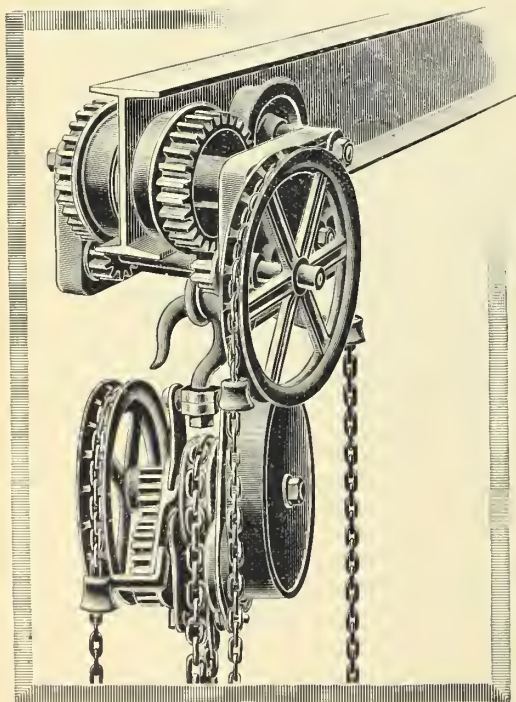
No.	Capacity.	Height.	Weight of Derrick.	Price.
1	330	12	45	\$7 20
2	540	12	58	8 12
3	1050	12	68	9 38
4	2300	12	86	11 25
5	3700	12	120	15 00
6	5800	14	165	18 75
7	13000	14	285	28 12
8	17000	16	375	42 50
9	25000	16	425	46 25
10	30000	16	450	48 75

FIG. 1835.

**OVERHEAD TRAMWAYS.****SINGLE TRACK RAILWAY WITH PLAIN TRAVELER.**

Capacity in pounds.	Largest distance between hanger bolts.	Price per foot.	Price of trolley.	Price of each curve.	Price of switch for regular lift of hoist.
500, 1000	5 ft. to 6ft.	\$.35	\$ 9.00	\$ 1.50	\$26.25
2000, 3000	"	.50	11.25	2.25	28.50
4000, 6000	"	.80	18.00	3.00	30.00
8000, 10000	"	1.10	22.50	4.50	33.75

FIG. 1836.

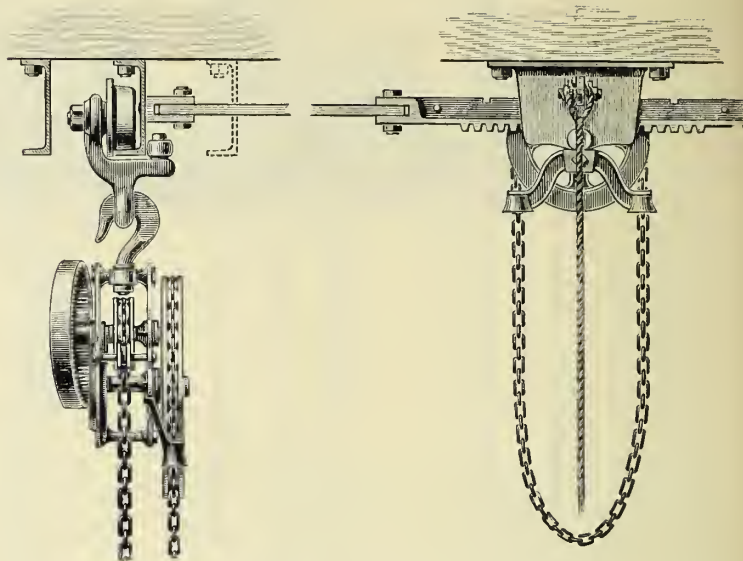
**OVERHEAD TRAMWAYS.****SINGLE TRACK RAILWAY WITH GEARED TRAVELER.**

This illustrated Overhead Tramway with I Beam Rail can be bolted directly to the ceiling or supported on trussels, and is well adapted for Foundries, Machine Shops, Warehouses, Stoneyards, Shipyards, etc.

In this type the trolley is geared and calculated for heavier loads or where the loads have to be moved carefully as in Foundries, etc.

By means of an endless hand chain the operator moves the trolley very steady and without jerking. Prices on application.

FIG. 1836a.

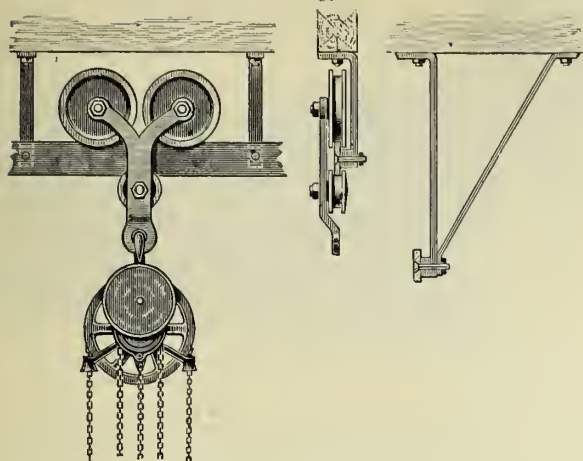
**SPEIDEL'S PATENT OVERHEAD TRAMWAY SWITCH.**

The above cut very clearly shows all parts of the switch, and needs no further description.

For transferring a load, without loss of time, from one track to another, the above illustrated switch can be put at any convenient place and worked from the floor by an endless hand chain. The latter can be placed at any distance from the track by simply shortening or lengthening the connecting rod, so as not to interfere with the handling of the larger pieces. The sliding rail is firmly locked in all positions, and no accidents can occur.

Prices on application.

FIG. 1837.

**OVERHEAD TRAMWAYS.****SINGLE TRACK RAILWAY WITH PLAIN TROLLEY.**

Capacity in pounds.	Largest distance C to C hangers.	Price of rail per foot.	Price of short hanger, each.	Price of trolley.	Price of each curve	Price of switch for regular lift of hoist.
	Ft. In.					
500	8 0	\$.30	\$.90	\$ 9.75	\$.75	\$27.75
1000	5 0	.40	1.00	10.50	.75	28.50
1500	6 0	.50	1.15	11.25	1.10	29.25
2000	6 6	.65	1.40	12.00	1.50	30.00
3000	5 0	.75	1.70	13.50	1.50	31.50
4000	5 6	.90	2.00	15.00	1.85	33.75
6000	5 0	1.05	2.40	17.25	2.25	34.50
8000	5 0	1.20	2.75	18.75	3.00	36.00
10000	4 0	1.30	3.35	20.25	3.00	37.50

OVERHEAD TRAMWAYS, TROLLEYS, HAND TRAVELING CRANES, ETC.

In connection with portable chain hoists, overhead tracks, either single rail with trolley or double track with a traveling bridge, are very often used to great advantage in the quick and easy handling of heavy articles in machine shops, foundries, boiler shops, warehouses, mills, factories, marble and stone yards, etc. We make our trolleys, regardless of low-priced competition, with large wheels—about double the size they are usually made—running on large, well-fitted pins of such size that one would be sufficient to carry the full load. In addition, we are using a smaller guide roller on the side or bottom of the rail, as the case may be, which reduces friction very much if the load is pushed at an angle, which is always the case in going around curves.

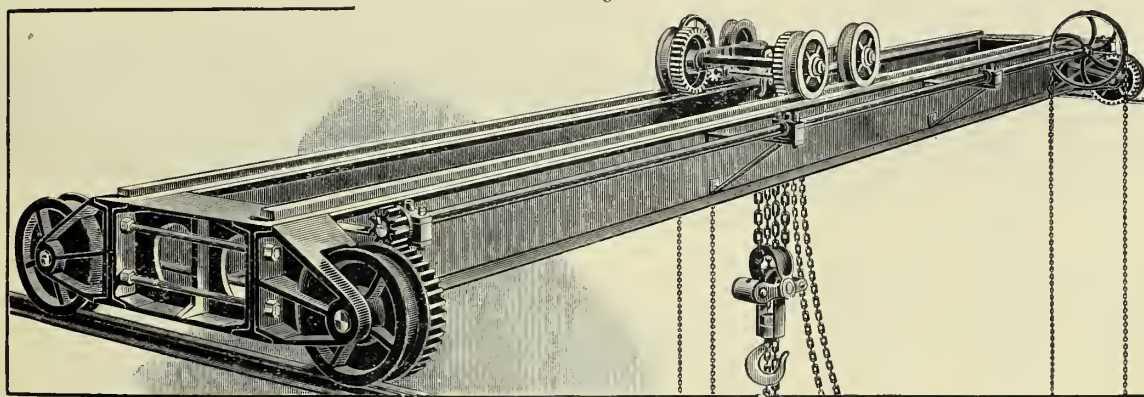
We have furnished overhead tramways for rolling mills with two and three way switches, radial swinging tracks to take iron in and out of furnaces and carry it to the rolls. Trolleys being constantly on the run, day and night, have given the best of satisfaction, and never caused any delay under the most severe tests.

Where ceilings are low, or where it is important to get as much lift with the hoist as possible, the overhead tramways may be used, or where the hoist is to remain on the track a combined hoist and traveler can be used, as shown in connection with the turn-table, still more increasing the lift. In many cases these latter systems will be cheaper than the flat iron track, as they require no hangers.

Where every portion of a given space shall be reached, we recommend the overhead traveling cranes, which we build up to 50 feet span and 15 tons safe working capacity. They are very handy and easy to be operated and will last a lifetime. When ordering or writing for prices for overhead tramways, please state maximum load to be handled; where long hangers are required, give the distance between overhead timbers and trolley wheels, clearing all obstructions, state length of track required, whether straight or curved, in the latter case showing on a plain sketch location of the track.

For traveling cranes state maximum load, distance from floor to top of rails, and distance from center to center of rails.

FIG. 1838.

**HAND TRAVELING CRANE WITH DOUBLE I BEAMS.**

We build hand traveling cranes, bridge either of I beams or riveted girders, up to 60 ft. span and 25 tons safe working capacity.

HAND TRAVELING CRANE,**WITH SINGLE I BEAM.**

With geared trolley to be worked from floor by an endless hand chain. Bridge is made of single I Beam with trolley running on lower flanges of same. All motions are effected by endless hand chains and are as follows:

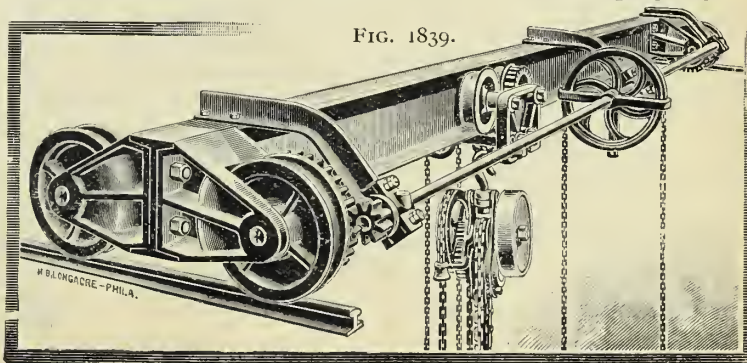
Hoisting and lowering, two speeds.

Bridge travel, one speed.

Trolley travel, one speed.

Bridge and trolley wheels are turned in the grooves, have anti-friction roller bearings and work very freely without a jar. These cranes are built strong and durable and cause no vibration. Prices on application,

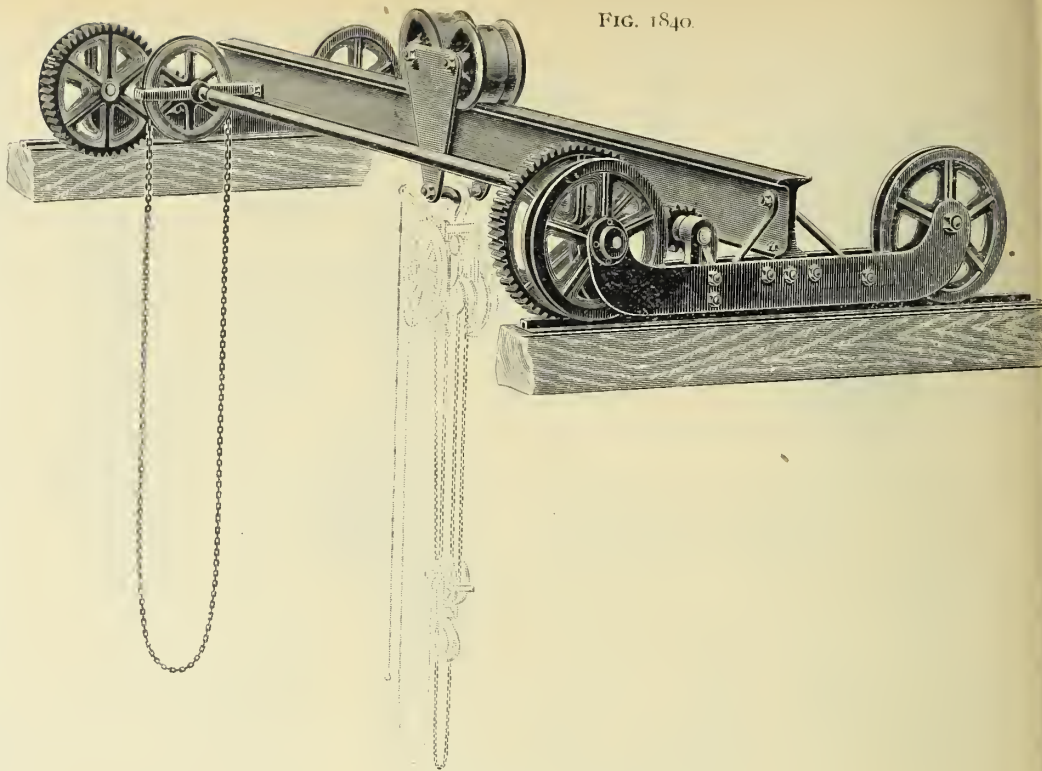
FIG. 1839.



THE Overhead Traveller presented upon this page, while in no sense intended to cover the space of a regular traveling crane, or to any extent replace it, still in a limited way is a very serviceable device for machine and other shops, either as an effective means for reaching tools located below it, or as an assistance in the erecting of light work. It is operated entirely by hand, and is intended for use with an ordinary set of shop chain falls.

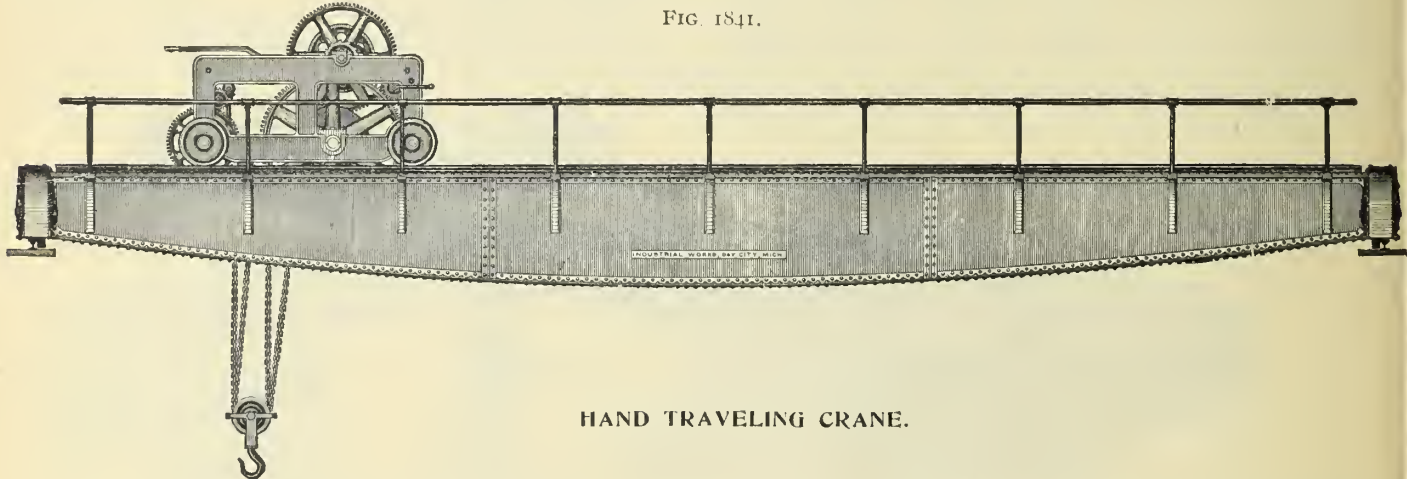
The construction of this crane is quite simple, refers principally to the bridge and the carriages at either end upon which it travels. The former of these is a plain I beam of size and weight suited to span and capacity. It rests upon the carriages to which it is rigidly attached and braced, and upon its upper surface offers a suitable track for the traversing of the trolley, which consists merely of its two wheels and a frame work suspended from these and hanging below the bridge. Traversing in the instance shown is effected from the floor by pushing the weight in the desired direction.

A light frame work forms the body of each carriage, with bearings at the ends for the short axles of the traveling wheels. One of the axles in each carriage is lengthened sufficiently on the inside for a single gear, which connects with pinions on a continuous driving shaft extending from carriage to carriage and supported at either end. A chain wheel upon this shaft, with an endless chain running to the floor below, affords the means for operating this propelling mechanism. This Overhead Traveller is thoroughly built from good materials and will be found an effective appliance.



OVERHEAD TRAVELER.

FIG. 1841.



HAND TRAVELING CRANE.

BESIDES power traveling cranes, those operated by hand are, many times, more conveniently used, and cranes of this type may be entirely successful, easily manipulated and suitable for many requirements. Their construction in so far as pertains to span, design of bridge and trolley, and other particulars, need not differ materially from the cranes already described, although cost may be somewhat cheapened by the substitution of a straight I beam trussed bridge, or one of wood and iron combined. Cranes of this class are especially suited to lighter service, although they may be successfully operated up to capacities of from fifteen to twenty tons.

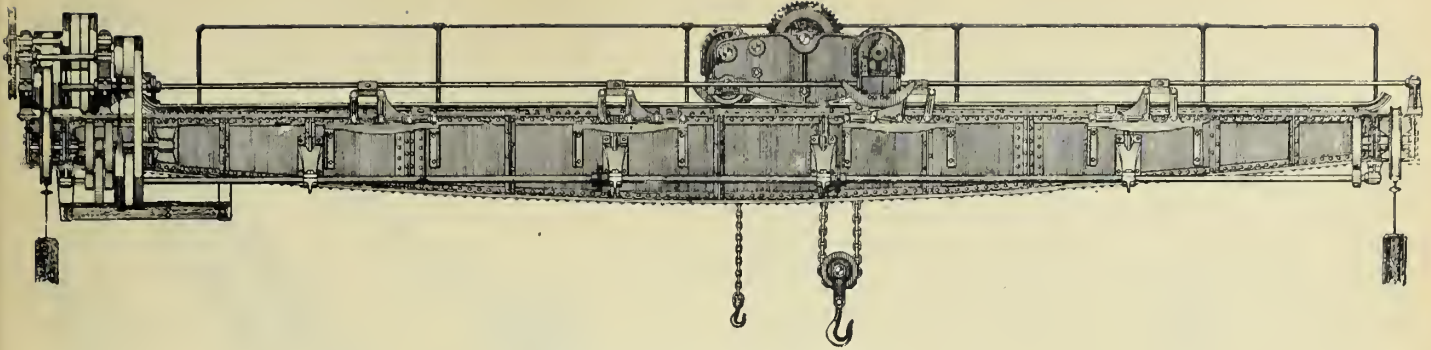
The crane shown herewith has a bridge composed of two steel plate girders of requisite depth and thickness. The top and bottom flanges are formed of angles and cover plates riveted together and to the webs, and the girders are made strong with broad splices, and stiffened at intervals of their depth with suitable T pieces. Properly joined at their extremities, a bridge strong and rigid is produced, and mounted upon four double flanged traveling wheels.

The mechanism for the operation of all parts of this crane is contained within or proceeds directly from the trolley, which consists of a cast iron supporting frame work moving upon four track wheels. Connected with the axle of one set of these wheels is a simple arrangement of independent hand gearing, by means of which the trolley is traversed in either direction.

For the hoisting of the load the geared connections are such that sufficient purchase is secured for readily handling maximum weights, and two speeds are attained adapted to light or heavy lifts. A suitable hoisting block multiplies the power, and the application of a friction strap brake and other devices ensures perfect safety to the attendants.

This crane equipment is complete in every respect, carefully built from the best of materials, and efficient for a variety of uses.

FIG. 1842.



POWER TRAVELING CRANE.

The preceding description explains a successful method of applying electricity to the working of a powerful traveling crane, and one simplifying its use so far as possible. Excellent as is this motive power for the operation of cranes, the presence of a suitable generating apparatus is necessary, and often in the absence of such some other form of power is desired or suggested by the surroundings. Line shafting is usually found in buildings where the traveling crane is made use of, and from this may be taken the power necessary for its operation. This may be applied in different ways, but by none perhaps with greater convenience or advantage than through the flying rope running continuously from end to end of the space traveled. The cut represents a crane designed for use with the flying rope, and with the power distributed for its various operations in a manner repeatedly proven very satisfactory.

The crane illustrated is one with a span of 50 feet, and capacity for lifting 15 tons, its bridge being composed of two steel plate girders of good depth and thickness. The top and bottom flanges are formed of heavy angles and cover plates riveted together and to the webs, and the girders are made strong with ample splices, and stiffened at intervals of their depth with suitable T pieces. These girders are properly joined at their extremities, and form a bridge exceedingly rigid and strong.

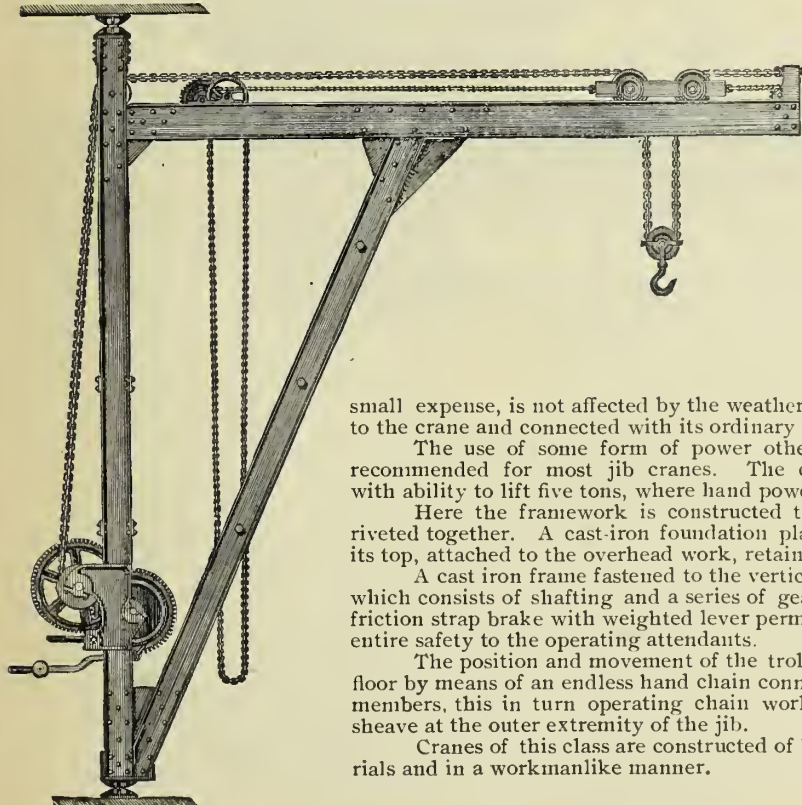
Upon one end of this bridge is mounted a cast-iron frame work which carries three independent shafts, each driven by the flying rope passing under and over their respective sheaves. Each of these short shafts, provided with a set of tight and loose pulleys, permits of immediate connection through direct and reversing belts with three longitudinal shafts extending to the further extremity of the bridge, and from which respectively power is distributed for the three operations of the crane, viz: the propelling of the bridge, traversing of the trolley, and hoisting of the load.

The first of these is very simply accomplished by means of pinions at the ends of one of these longitudinal shafts which drive the axles of the propelling wheels.

The construction and equipment of this type of cranes is first-class and complete in every respect, and this method of power transmission may be applied to those of large capacity.

FIG. 1843.

HAND JIB CRANE.



Brief mention is made of steam, compressed air and electricity as the means for operating jib cranes of a heavier class. As steam can, in a majority of cases, be the more conveniently applied, it is the power perhaps more generally made use of. With suitable connections and the exhaust properly provided for, it affords complete satisfaction. Instances will present themselves, however, where compressed air may be used to advantage. It is easily conveyed considerable distances, does not freeze up, and condensation and exhaust present no difficulties. Its use, however, presumes the presence of an air compressor and reservoir, and renders these necessary adjuncts.

For many locations, and especially where a dynamo is used for lighting by night or for other purposes, electricity will be found a most convenient means for driving the machinery of such a crane. It can be carried any distance necessary and at a comparatively small expense, is not affected by the weather, and is easily applied through a suitable motor attached to the crane and connected with its ordinary gearing.

The use of some form of power other than hand, and which can usually be easily secured, is recommended for most jib cranes. The cut represents a crane of this type, of light capacity, with ability to lift five tons, where hand power is all that is necessary for its convenient handling.

Here the framework is constructed throughout of steel beams, properly connected, bolted and riveted together. A cast-iron foundation plate takes the weight of the crane, and a suitable casting at its top, attached to the overhead work, retains it in position.

A cast iron frame fastened to the vertical members of the crane supports the hoisting mechanism, which consists of shafting and a series of gears affording a triple purchase and a satisfactory speed. A friction strap brake with weighted lever permits of controlling the position of the load at all times with entire safety to the operating attendants.

The position and movement of the trolley in either direction is controlled and effected from the floor by means of an endless hand chain connected with gearing at the inner extremity of the horizontal members, this in turn operating chain work attached to either end of the trolley and passing over a sheave at the outer extremity of the jib.

Cranes of this class are constructed of heights and radii to suit requirements, of the best of materials and in a workmanlike manner.

The column is a casting in one piece, and from 1 to 2¾ inches thick (according to size of crane). Bottom of post and top of deck plate are faced, making a fitted joint, and are held together by the foundation bolts, which pass through the stone foundation, and are secured to the anchor plates at the bottom of pit. A disc is fitted into the top of column with a large steel pin (which has an anti friction bearing), and on which the jib turns, the jib being secured to column by bolt rods, which run from the end of jib to the yoke, which turns freely on the swivel pin and its bearing. Yoke has two vertical rods, which pass through the shoe (casting) at the bottom. The shoe has two turned cast iron rolls of large diameter, which track around a turned belt on the column so that the jib turns easily, having the friction only on the swivel pin bearing and shoe wheels. The jib consists of two wrought iron channel beams, which are bolted at top to the bonnet, and at bottom to the shoe; tie bolts connect the beams at intervals between the bonnet and shoe. The gearing is double, with the pinion on crank shaft, which works into both gears for fast or slow motion, or at half way between each locks both, or can be shipped out of both, so that the load can be lowered without the crank's whipping. Drum shaft and gear shaft are large; gearing throughout is unusually powerful. Chain drum is a hollow casting, with longitudinal internal ribs and spiral around the outside for chain to follow in. Short-linked crane chain of the best quality is used on all our cranes, the bonnet sheaves are large, and operate with but little friction. Improved friction brake is conveniently located, and arranged so that by its use the operator may hold the load at any desired point, or control the rapidity of its descent. The whole crane is simple in construction, easily operated (any one can use it), and is guaranteed to give satisfaction.

Foundation should be built of stone and thoroughly grouted. Foundation plans furnished on application. These cranes are furnished with the iron work complete. Purchasers are to put in the foundation.

SPECIFICATIONS.

9 ton crane, 14 ft. radius, weight, 18000 pounds
 12 ton crane, 16 ft. radius, weight, 20000 pounds
 15 ton crane, 18 ft. radius, weight, 25000 pounds
 20 ton crane, 20 ft. radius, weight, 28000 pounds

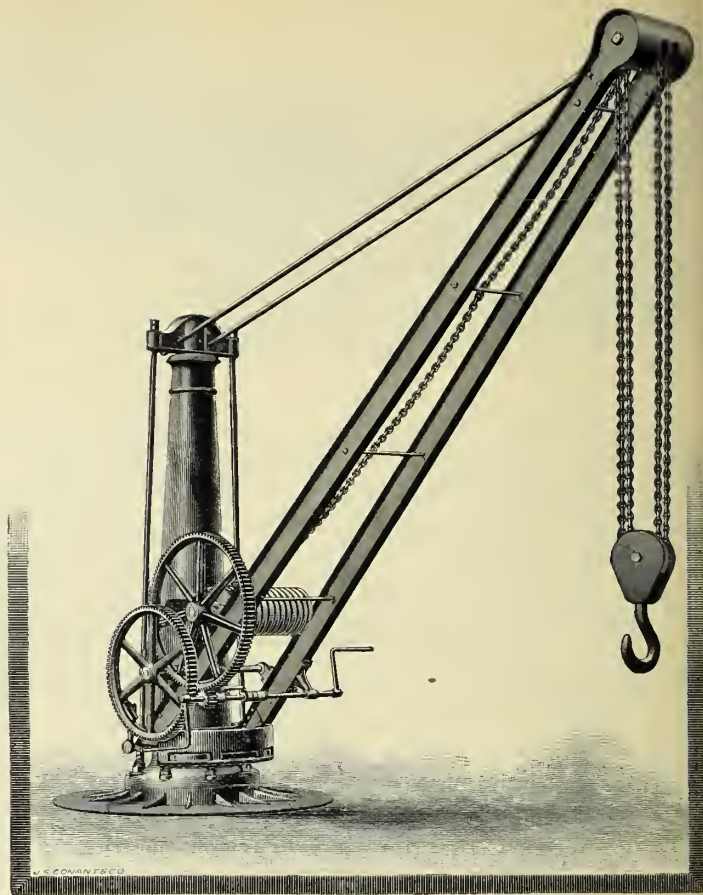
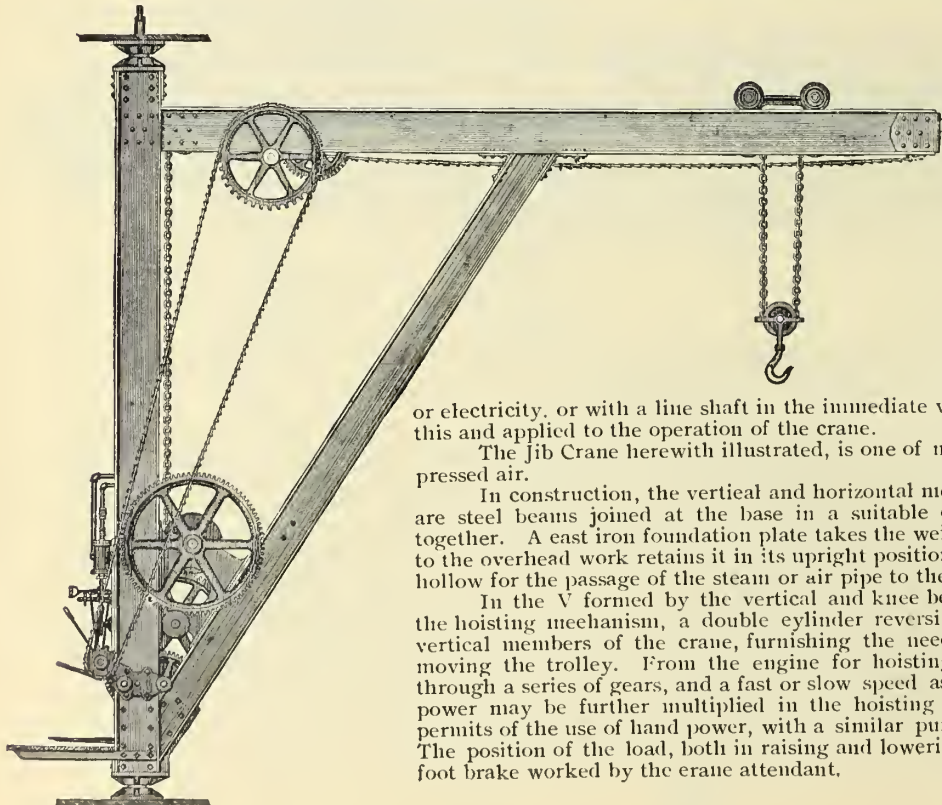


FIG. 1845



POWER JIB CRANE.

In numerous instances, the use of traveling or walking cranes is impracticable owing to the construction of buildings, and possibly the space which it is desirable to cover is a limited one, and for these reasons some other form of crane preferable. Where the overhead work of a building will permit of attachment to it, whether it be to roof or floor timbers, the jib crane is a common type for machine and boiler shops, foundries, iron and rolling mills, and advantageously used in a multitude of other places. It is built of varying lifting capacities, and for light service is generally manipulated with hand power. Heavier designs usually show an equipment for using steam, compressed air

or electricity, or with a line shaft in the immediate vicinity, power may be readily conveyed from this and applied to the operation of the crane.

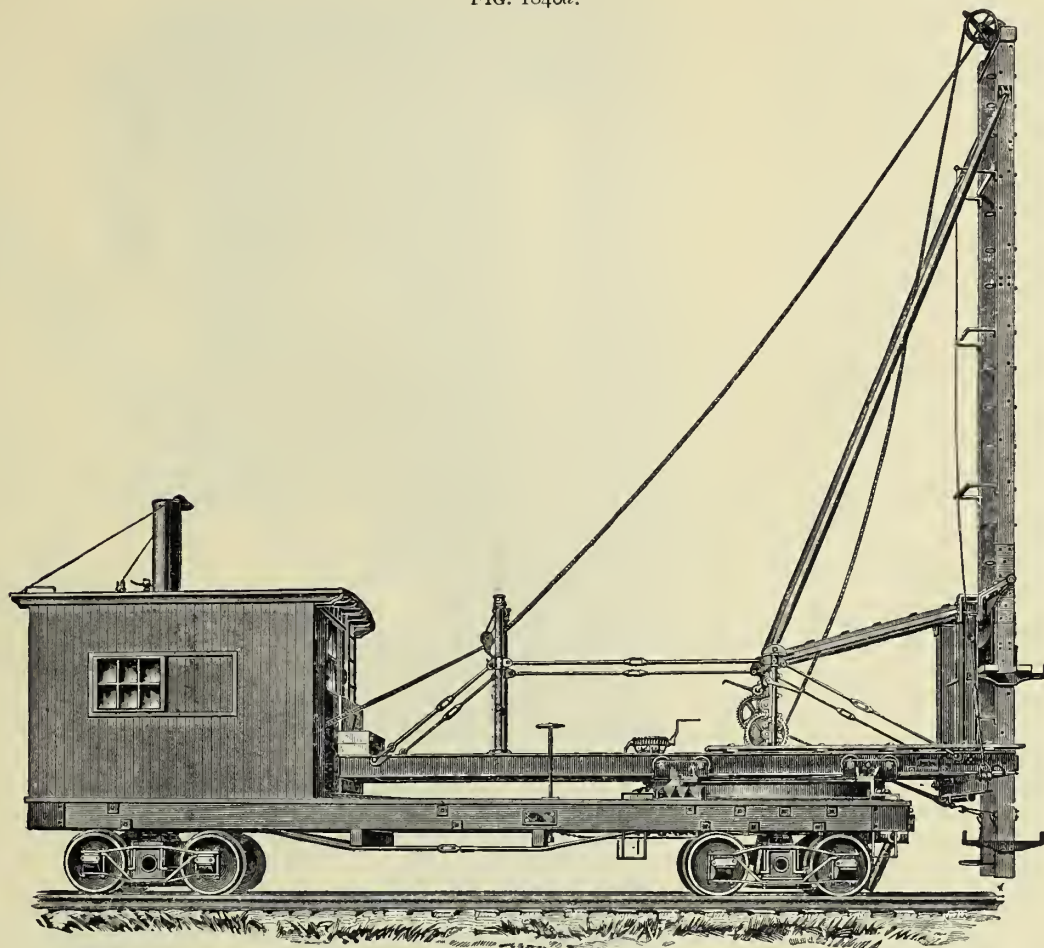
The Jib Crane herewith illustrated, is one of medium capacity, arranged for steam or compressed air.

In construction, the vertical and horizontal members of the crane as well as the knee braces are steel beams joined at the base in a suitable casting, and otherwise connected and riveted together. A cast iron foundation plate takes the weight of the crane, and a top casting attached to the overhead work retains it in its upright position, this casting, as well as the center pin being hollow for the passage of the steam or air pipe to the engine below.

In the V formed by the vertical and knee beams is carried the frame work for supporting the hoisting mechanism, a double cylinder reversing engine of suitable capacity attached to the vertical members of the crane, furnishing the necessary power for operating this, as well as for moving the trolley. From the engine for hoisting purposes, a quadruple purchase is attained through a series of gears, and a fast or slow speed as may be suitable for the load. The lifting power may be further multiplied in the hoisting block if necessary, and a clutch arrangement permits of the use of hand power, with a similar purchase and speeds, if at any time desirable. The position of the load, both in raising and lowering, is constantly controlled by a friction strap foot brake worked by the crane attendant.

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FIG. 1846a.

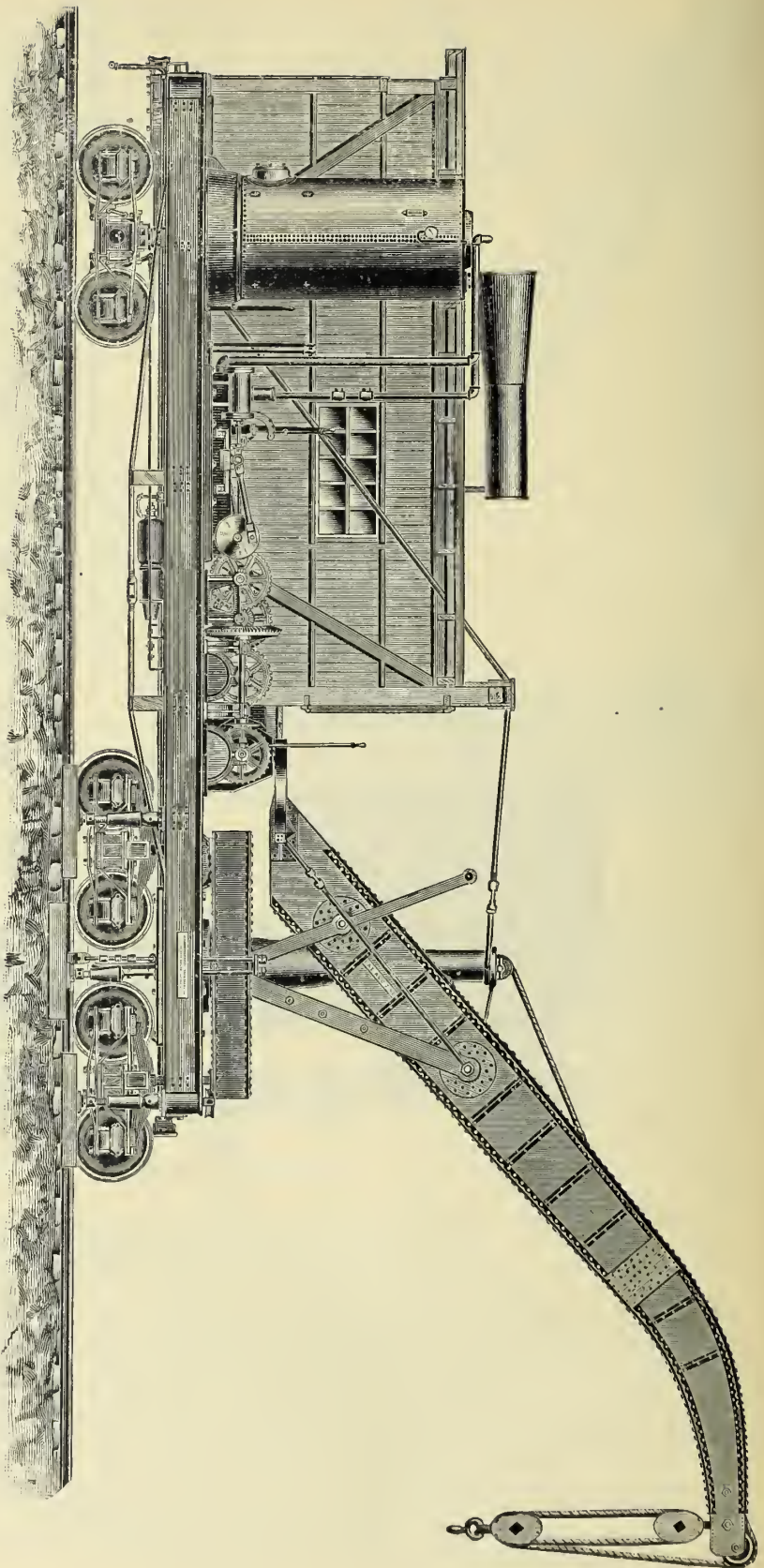


PORTABLE EXTENSION PILE DRIVER.

THE Pile Driver to be used advantageously in railroad work must be portable, so as to be readily moved to any point. If self-propelling, a desirable feature is added, as in operation it can often take care of itself, and dispense with the use of a locomotive. It must have great strength, as its work is of a nature which imparts sudden strains in all directions. It should have capabilities for reaching extreme points for driving, whether directly ahead or out to either side of track, and the best arrangement of its leaders in raising, lowering or slewing, whether for washout work or in steady service where passing trains are to be avoided, must be with a view to quick handling and the least possible delay.

The Pile Driver herewith shown, successfully combines all of these important features, with many minor conveniences, and in construction consists of a heavy oaken car, fully equipped and supplied with jacks at its front to give additional stability. This car, at one end, carries an upright steel boiler, with a double cylinder double friction drum hoisting engine of the latest type. A separate drum is provided for lifting the pile into position and working the hammer. The same engine has self-propelling connections, if desired. The leaders are ordinarily 37 feet high, and the hammer used 2,500 pounds in weight. Complete mechanism is provided upon the front end of the car for raising or lowering the leaders, and for extending or slewing them, so as to drive as far as 16 feet ahead of the car, or from 12 to 14 feet out on either side, from center of track. This Pile Driver is suitable for light, heavy or any variety of railroad work.

Details and full description furnished upon application.

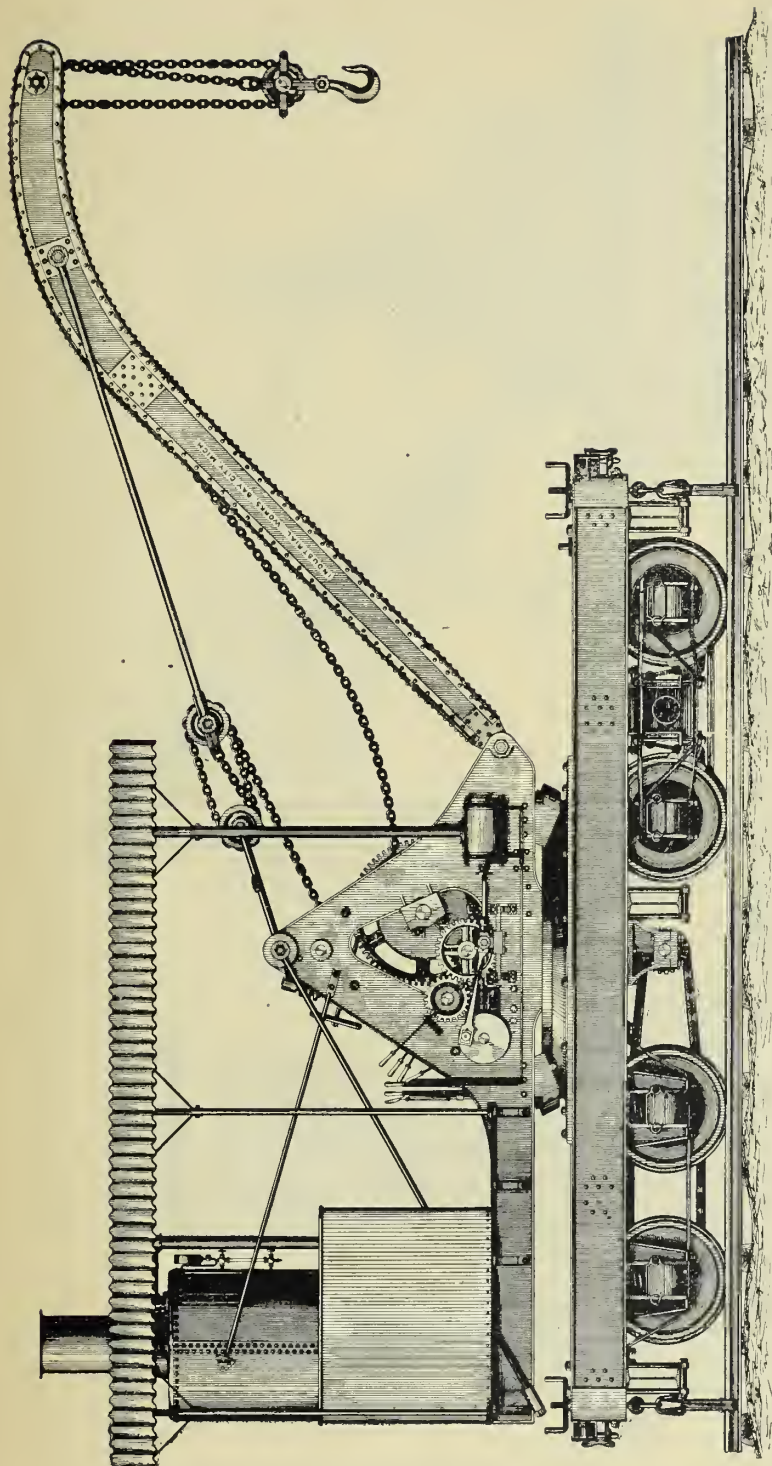


PORTABLE THIRTY-FIVE TON STEAM CRANE.

OUR most powerful steam wrecking crane, and the one intended for the heaviest service, is shown above. This crane possesses many features which are advantageous in an appliance of this kind. With a capacity for lifting thirty-five tons, it must necessarily be of massive design and have the weight required to afford sufficient stability for its heaviest work. This weight is well distributed over a car of good length, and at the point where it becomes excessive in heavy lifting, has an extended wheel base beneath it. The jib is of such shape, height and length as enables it to reach out and over a car, locomotive, or other such object, and perform its work conveniently and quickly, at the same time being arranged so that its outer extremity may be lowered and the whole assume a horizontal position, as becomes necessary when it travels from one point to another. Provision is made upon the front end of the car so that a rope run out to either side, can assist in pulling anything towards the track which may lie a considerable distance away. The jib is slewed, and hoisting and all other work performed with steam power.

The construction of car and crane is largely of steel; a suitable boiler, with double cylinder engine and a train of powerful hoisting and slewing gearing is employed; and the equipment is completed with the necessary blocks and tackle for regular service.

Details and full description furnished upon application.



STEAM LOCOMOTIVE CRANE.

15 TO 20 TONS.

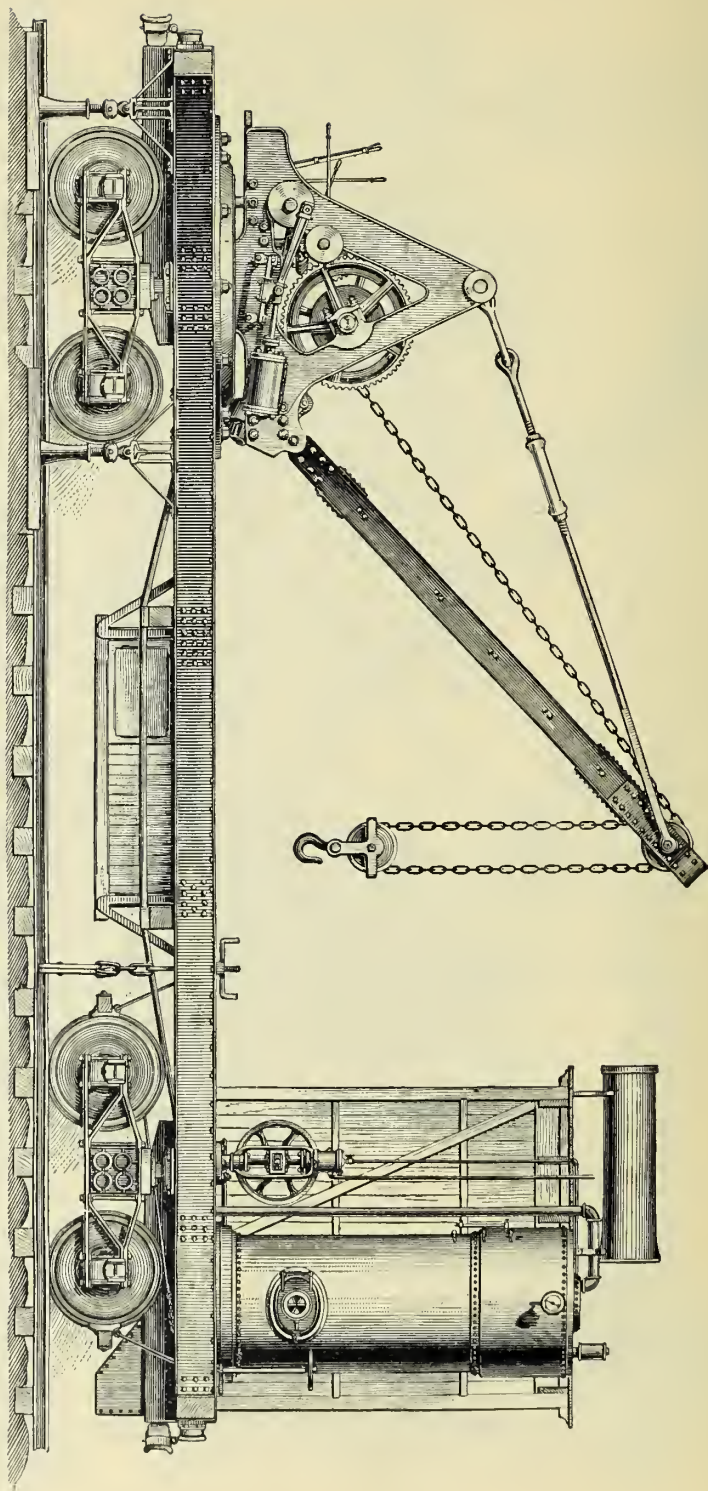
THIS powerful crane approaches the limit in capacity possible for a portable appliance of this kind, confined, as it must be, for the use of railroads, to the narrow dimensions of a standard gauge track for its stability. Its use is recommended upon roads with an extensive and heavy traffic. Steam power is also applicable to other forms of cranes of lesser capacity, although powerful appliances, quick working, and preferred, for some reasons, by many roads.

The cut upon another page represents a crane of such a type, with features which particularly adapt it to wrecking service. It will readily lift 15 tons, with a jib radius of 20 feet, measured from the center of the car to the center of the hoisting block. The arrangement of the jib is such that its radius is made variable, which permits of raising it to almost any necessary height, and of lowering it to within a convenient distance of the track. This crane slews through a complete circle upon its car, so that it can be worked in any direction, the weight of the boiler, with fuel and water, acting as a counterpoise to that of jib and load, with additional stability secured through the use of extending beams, jacks and track clamps. Provided with a winch, it is enabled to pull towards itself from points otherwise beyond its reach. It is self-propelling, and this will often be found decidedly advantageous, although attachments for this purpose are not intended for moving it long distances. All mechanical movements, the raising and lowering of the load at different speeds, variation of jib radius, slewing and propelling, are made with the power of its own engines.

Two independent steam cranes of similar design and capacity may be mounted upon either end of one long car, forming a powerful and convenient combination. Steel enters largely into the construction of car, crane and boiler.

Details and full description furnished upon application.

FIG. 1848.



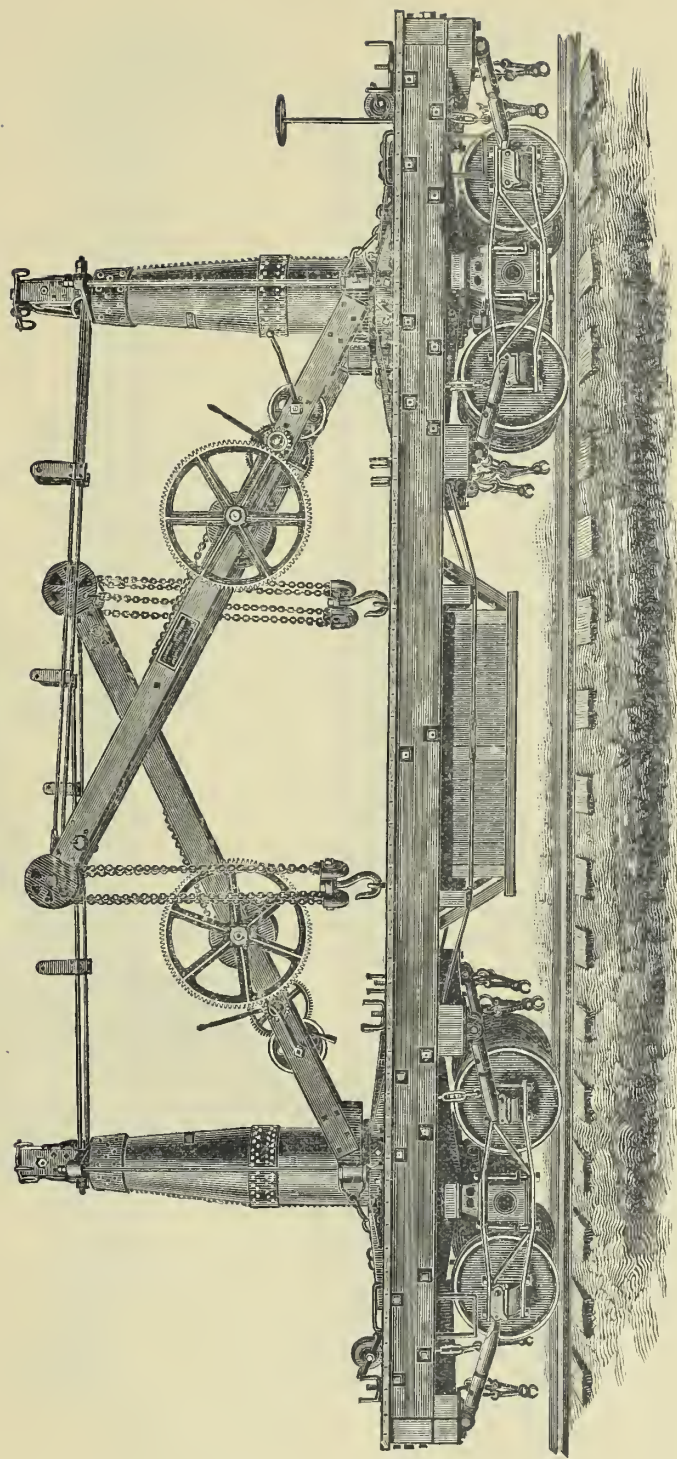
STEAM RAILWAY CRANE.

ANOTHER form of crane is here shown, intended to take the place of the ordinary hand crane and car where steam power is preferred. It may, in a general way, be said to possess many points of similarity—capacity, reach and height of lift; but with steam has advantages as a wrecker over any crane operated by hand. It has been the effort to simplify the mechanism here found as far as possible, and to this end the crane has no self-propelling connections, and the radius of jib is fixed, ordinarily being sixteen feet, measured from the point about which the crane swings to the center of the hoisting block.

This crane, with a capacity for lifting up to fifteen tons, at different speeds, also slews through a complete circle with its own power, and is provided with a winch which enables it to pull towards itself from points otherwise beyond its reach. Designed for a track of standard gauge, its stability is further increased by the use of extending beams, jacks, and track clamps.

Details and full description furnished upon application.

FIG. 1849.

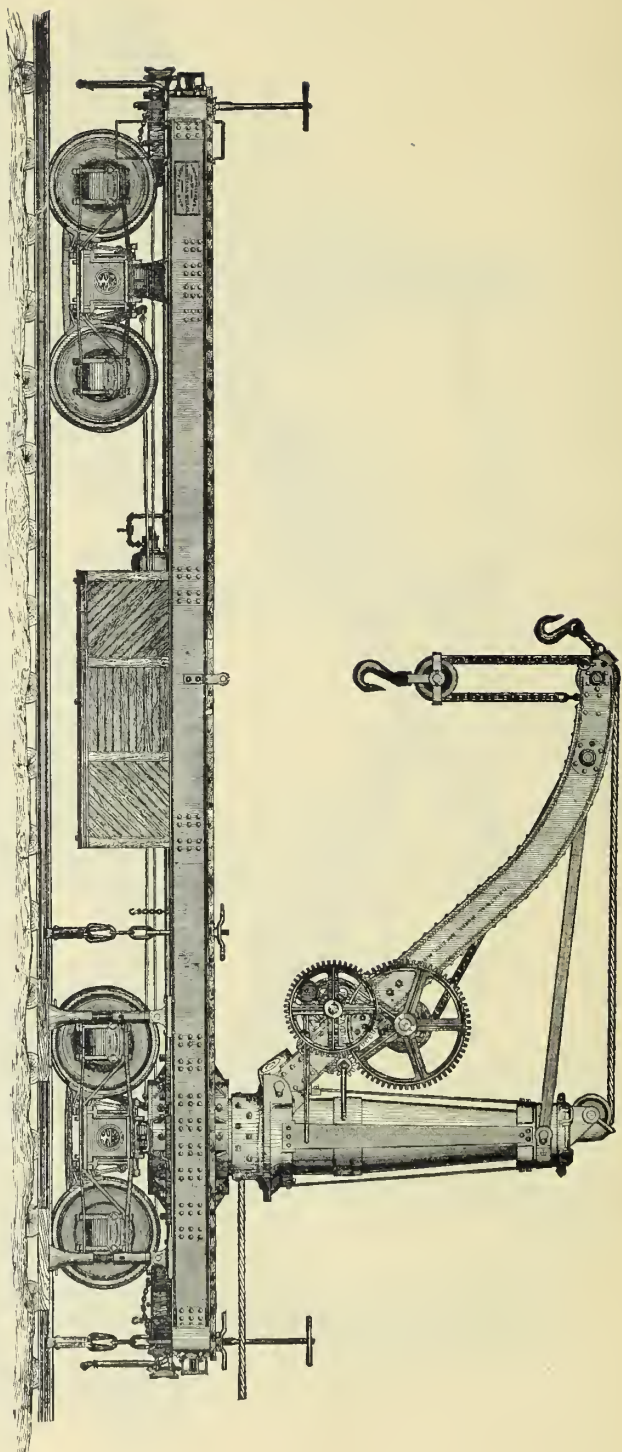


HAND CRANE WITH WOODEN CAR.

ANOTHER form of hand crane and car is here shown, less expensive than that referred to upon another page, yet possessing some of its desirable features. A wooden car is made use of, specially designed, however, for its particular line of service, and mounting one or two cranes, as may be preferred. A perfectly straight jib is employed, and hoisting mechanism somewhat simplified, yet powerful and with safety brake, is provided. Connections for lifting with the assistance of a locomotive form part of the outfit, and the equipment is completed with jacks and track clamps for use in heavy work.

Details and full description furnished upon application.

FIG. 1850.



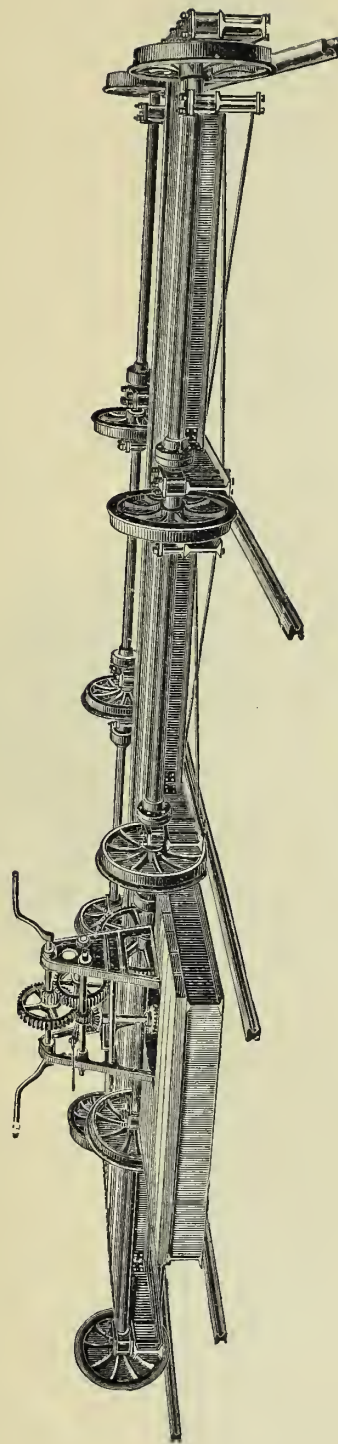
HAND CRANE WITH STEEL CAR.

UPON many railroads a steam crane may be considered unnecessary at points where some form of a portable crane is still almost indispensable, not only for wrecking purposes, but also for the convenience of shops and yards. Several varieties of the hand type are offered by different makers, and some railway companies build, themselves, in this direction. Most of these cranes, however, with a construction largely of wood, lack in strength and have a lessened capacity in consequence. A want of durability proceeds from the same cause, and there is an absence of certain attachments and conveniences which may render cranes of this class doubly useful.

The crane illustrated above possesses some essentials which are worthy of inspection. It has a steel construction for almost every part; the car designed for special use, and unusually strong, is provided with an ample tool box, and equipped with a Westinghouse air brake, if specified, as well as suitable jacks and track clamps to relieve the trucks and increase its stability; the jib curved at its extremity, is in its most convenient shape; the hoisting mechanism most efficient and safe in its operation; and the means afforded for hoisting with the assistance of a locomotive, adds to its general usefulness. This crane will lift fifteen tons, and two similar cranes may be mounted upon one car, forming a powerful and convenient combination.

Details and full description furnished upon application.

FIG. 1851.



HAND TRANSFER TABLE.

WHERE the service to be rendered by transfer tables is limited and irregular, the use of electric or steam power would be expensive and unnecessary. Hand power may be applied in such cases so that the operation of even long and high capacity tables is successful in all respects. The power applicable for propelling is at the same time useful for pulling onto or removing the load from the table.

The cut above represents a hand power transfer table, 40 feet long, although this length may vary in construction to suit any ordinary requirements. The frame work of this table is constituted of longitudinal and transverse steel I beams, properly fitted and riveted together, the system of bracing being such as to make it extremely rigid in all directions. The wheels upon which this table travels are ordinarily 36 inches in diameter, with a flat chilled thread, and machined so as to be true and all of equal size. These wheels are fitted to continuous shafts which extend from end to end of the table, each of these shafts being in sections, coupled together, so that any wheel or section may easily be removed with necessity for repairs without disturbing the remainder. These shafts, with bearings at proper intervals, run in boxes containing a suitable oil and waste supply, from which is suspended the frame work of the table.

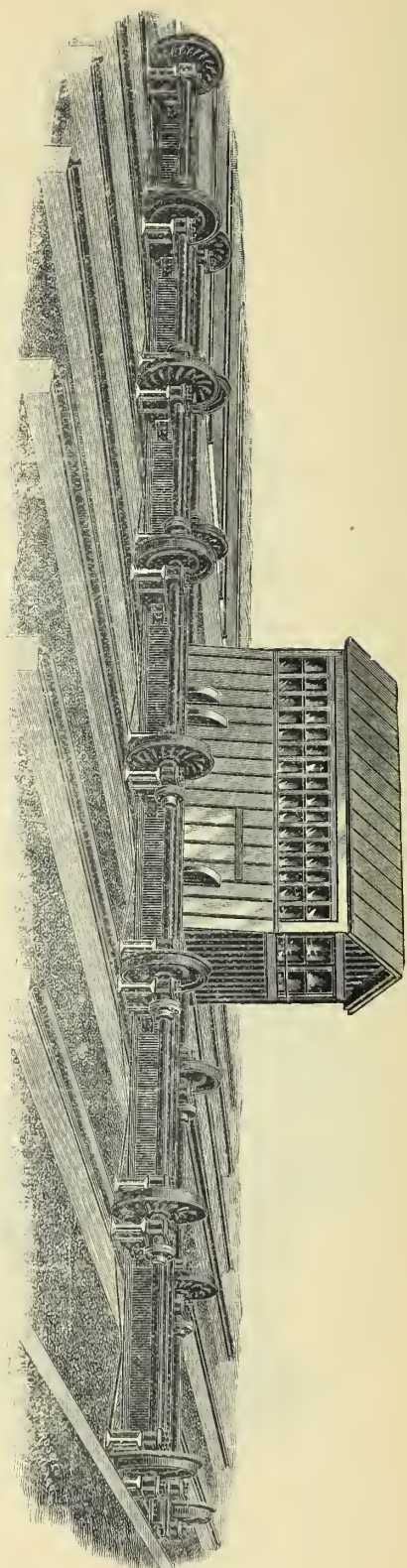
Two transverse beams of the table's frame extended beyond its remaining width, provide a support for the operating mechanism. This consists of two cast iron uprights connected and carrying the necessary shafting, gearing and other parts. For propelling, a double and triple purchase with fast and slow speeds for light or heavy loads is provided, and motion is imparted to the nearest continuous shaft and all the wheels attached to it. Extended track adhesion is in this manner secured.

For handling the load, either in pulling it onto the transfer or removing it, a rope spool is made use of, located in the main body of the table, and connected with the propelling gearing. A simple arrangement of clutches turns the power imparted through this mechanism to the operation of this spool, and the necessary rope and tackle completes the outfit for this purpose.

The deck of the table is a level surface coved with 2-inch planking.

The design of this transfer table, and its construction from the very best of materials in all parts, ensures an appliance which embraces the latest and best features, which possesses great strength and which will be found durable with long continued usage.

FIG. 1852



POWER TRANSFER TABLE.

THE great weight of modern locomotives, and the fact that the latest and most convenient arrangement of machine and car shops includes one or more transfer tables, has led to the building of these valuable appliances in a manner possessing largely increased strength and durability, and in lengths much greater than formerly.

With a frame work sufficiently strong and rigid, there are still many other advantageous features which the most complete and successful transfer table possesses. A pit with the least necessary depth is always desirable. Wheels should be of good diameter that the movement of the table may be rapid and easy, and of such special design as will best suit them to this particular service. For propelling, power from whatever source should be applied directly to a considerable number of these wheels, and to ensure an even movement to all parts of the table, they should be of like diameter and intimately connected. No table is complete without the mechanical means for handling its load, both in pulling it on and removing it.

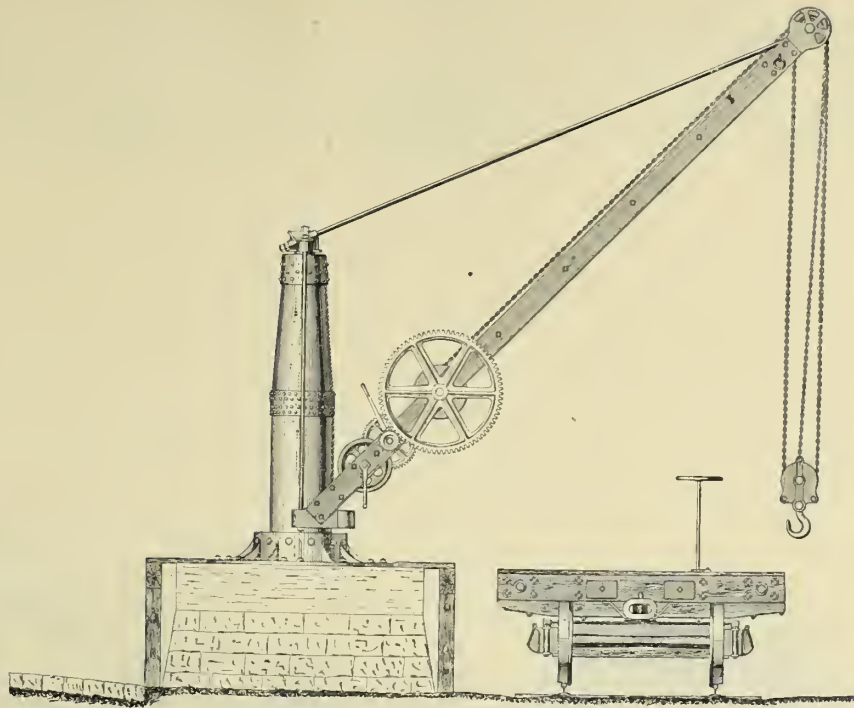
The transfer table here shown possesses each of these features, and in a general way may be described as follows: With a length varying according to requirements, its frame work is constructed of longitudinal and cross steel I beams of suitable depth and weight, fitted and riveted together, and with bracing to give it the necessary rigidity in all directions. This frame work suspended from the running gearing, thereby greatly lessens the depth of pit required, and again is of such ample dimensions as to afford sufficient width between the wheels which project above the surface, for any ordinary locomotive, car or other railway appliance. The cross beams at a central point are extended beyond the remaining width of the table, and properly supported for carrying an electric motor, steam power, or whatever form of mechanism may be used for propelling purposes.

The wheels upon which this table travels are ordinarily 36 inches in diameter, with chilled flat treads, and ground accurately to the same diameter. All of such wheels upon either side of the table are attached to continuous shafts running through from end to end, and connected in sections by means of couplings, so that with a necessity for repairs, any wheel or section may be readily removed without disturbing the remainder. With this form of construction these wheels revolve together, the motive power is applied directly to all of those on one side of the table, and the whole is materially stiffened and strengthened. At regular intervals, one upon each side of every wheel, are bearings and boxes from which the table is suspended. These boxes are provided with suitable chambers for oil and waste, so that all bearings are properly lubricated.

For pulling onto or off the table, a drum is furnished which is operated in connection and with the power which propels the table. This drum coils a sufficient amount of rope to make this part of the work conveniently and quickly accomplished.

The deck of the table is covered with 2 inch planking, and the propelling and other mechanism suitably housed for protection from the weather.

FIG. 1853.



FIXED HAND PILLAR CRANE.

ANOTHER form of crane very popular with railway companies and manufacturing establishments, and adapted to uses quite similar to those enumerated for the regular transfer crane, is that of the pillar type. For some locations it is preferable to the other from the fact that a considerable space in different directions is covered by the radius of its jib in a complete circuit. The ground room occupied with its base is but small, so that including within its reach, if necessary, a track on either side, considerable space for storage or other use still remains.

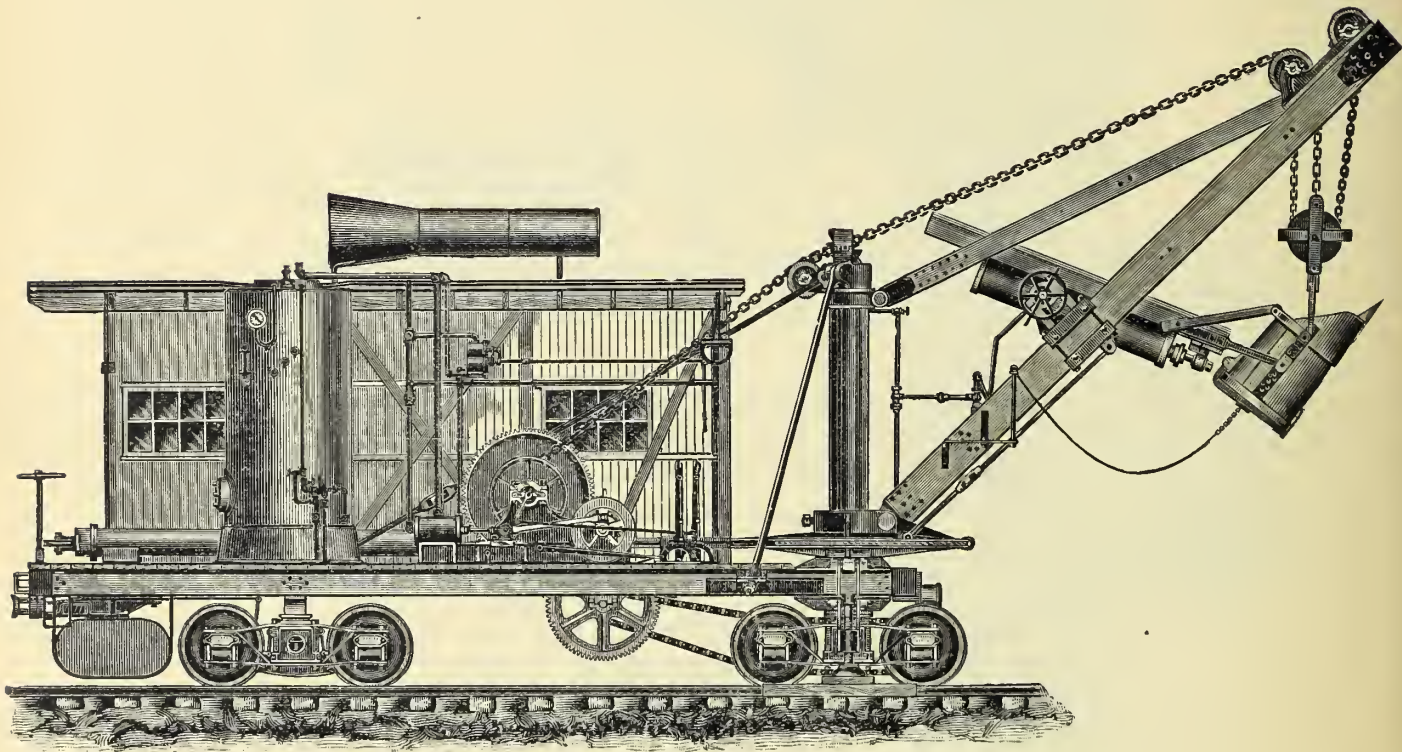
This hand pillar crane is constructed in a manner and of materials which permit of its safe and constant use in any climate; it is built of capacities for lifting 10, 15, 20 and 30 tons, and with a fixed radius of jib to suit location and requirements, ordinarily ranging from 15 to 20 feet. The base plate of this crane is a massive casting possessing all the strength requisite to withstanding the strains of its heaviest lift. It is more suitably used with a foundation of masonry, and is retained in position by anchor bolts passing down through it. This base plate is fitted with a series of set bolts, capable of adjustment, around the opening for the mast, and which screwed up against this member hold it rigidly in place. The mast or center post is built entirely of flange steel, rolled to proper size and riveted together in sections, the lower of these being cylindrical in form, the upper tapering towards the top. This mast is reinforced at different points on the inside with plates and collars to afford additional strength, and to take the thrust of set bolts, and that of the jib when lifting. At its top it is capped with a casting taking the forged center pin.

The jib is composed of steel I beams or channels, according to capacity, and is securely braced and latticed with distance pieces as may be necessary. With the heaviest cranes the shoe is fitted with anti-friction rollers so that the slewing motion is an easy one. The hoisting mechanism in similar cases has a quadruple purchase attained through a series of gears, and the lifting power is further multiplied in the hoisting block. For the maximum load of the crane, the slower and more powerfully geared purchase is made use of, while with lighter weights a faster motion is attained through a lesser purchase. The position of the load at all times, both in raising and lowering, is readily controlled through a pawl and ratchet, and a friction strap brake with weighted lever, ensuring absolute safety to the attendants.

The hoisting chain is of the best tested quality, and with all other materials in keeping, and workmanship first class, these cranes are both efficient and durable.

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FIG. 1854.



STEAM SHOVELS.

No. 1 Shovel, dipper capacity, $1\frac{3}{4}$ cubic yards. Weight, 49 tons.

No. 2 Shovel, dipper capacity, $2\frac{1}{4}$ cubic yards. Weight, 55 tons.



Dentiss Tool and Supply Co.
New York and Chicago